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Empirical Essays On The Interaction Between Regulation And Corporate Governance In The Banking Industry

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TESIS DOCTORAL

EMPIRICAL ESSAYS ON THE INTERACTION BETWEEN REGULATION AND CORPORATE GOVERANCE IN THE BANKING INDUSTRY

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"It is not by augmenting the capital of the country, but by rendering a greater part of that capital active and productive than would otherwise be so, that the most judicious operations of banking can increase the industry of the country."

Adam Smith (1776)

The Wealth of Nations

ABSTRACT

The existence of banks as financial intermediaries and the functioning of the banking system are argued to be of great importance in determining a country's economic growth and stability. Governments and national institutions all over the world are aware of the important role played by financial institutions and impose several regulations on the banking sector. Remarkably, the existence of regulations constraining the action of banks may make the governance of these institutions different from non-financial firms' corporate governance. In addition to being heavily regulated, banks are argued to be unique because they are highly leveraged and more opaque than non-financial firms.

The purpose of this thesis is to contribute to a better understanding of the functioning of banks, by providing empirical evidence of how specific dimensions of bank activity are affected by internal and external corporate governance mechanisms. Precisely, three different essays are conducted in order to help explaining some features of banks' functioning.

In the first essay, we offer evidence on the relationships of bank ownership concentration with both risk and performance, in the presence of broad bank regulations and other country-level conditions that shape banking industry.

In the second essay, we help to characterize bank lending practices through the assessment of the relative roles of three broad bank regulations, namely, (i) capital requirements, (ii) official supervision and (iii) external private monitoring, on the determination of risk terms of loan contracts.

In the third essay, we provide evidence of the effectiveness of two dimensions of market discipline of banks: first, the market monitoring of banks through equity

markets' price reactions to loan announcements, and second, the banks' responses to these market reactions in the direction of pursuing sound risk-taking practices.

The results achieved by the three empirical essays are derived using samples containing information about banks located in a large set of countries, as well as measures of bank regulations and other country-level traits. The first essay uses a comprehensive sample of 4,681 bank-year observations of ownership and accounting information produced by a set of 795 large, medium and small commercial banks located in 47 countries, in the period from 1997 to 2007, to examine the influence of bank ownership structure, country-level bank regulations and investor protection laws on bank risk and performance, employing the so-called Generalized Method of Moments (GMM), which consists of techniques of dynamic panel data estimation. The second essay relies on a sample of 46,453 loans extended by 278 large commercial banks of 39 countries, during the period from 1998 to 2006, to perform an OLS regression analysis that helps to explain how spread and maturity of loan contracts are affected by bank regulations and their interactions with other country-level factors. The third essay employs event-study techniques to assess market reactions in stock prices of 119 banks located in 35 countries to 1,354 loan announcements made in the 1998-2006 period, and OLS regression analysis to explain how reactions are associated to a country's degree of external private monitoring of banks.

The contributions of this thesis to the literature are summarized as follows:

(I) Relationships between bank ownership, risk and performance:

- Banks' ownership concentration and performance have a cubic relationship, supporting the theoretical hypotheses of effective monitoring at low levels of ownership concentration, expropriation or loss of managerial discretion at moderate ownership concentration, and high costs of expropriation at high levels of ownership concentration.

- Banks' ownership concentration and risk have a U-shaped relationship, supporting that shareholders' incentives to take risk prevail when their equity stake is above a threshold.

- Capital regulations, bank competition and shareholders protection laws interact with ownership concentration to influence the performance of banks.

(II) Effectiveness of bank regulations:

- Capital regulations stringency is effective in simultaneously reducing the risk and improving the performance of banks.

- The stringency of capital regulations reduces loan contracts' risk characteristics (spread and maturity) only above a threshold.

- More powerful official supervision increases the risk of loan contracts, instead of reducing it.

- Regulations promoting the private monitoring of banks complement capital requirements regulations as mechanisms that reduce the risk of lending.

- A country's degree of financial development, legal enforcement and competition in the banking industry complement capital and private monitoring regulations to improve the risk characteristics of loan contracts.

(III) Relationships between market discipline and bank lending:

- Abnormal bank stock returns are significant on the days surrounding a bank loan announcement. Positive abnormal returns are larger and more frequent in countries with high private monitoring, while negative abnormal returns are lower and more frequent when the private monitoring is low. The evidence supports the idea that more regulations promoting the private monitoring of banks - e.g., regulatory requirements of information and accounting disclosure, external auditing, depositor protection, use of

subordinated debt, and discipline - improve the quality of market signals, and induce the pursuing of sound lending practices on the part of banks' managers.

- The private monitoring of banks is especially important in countries with low enforced legal systems, poorly developed stock markets, low concentrated banking industry, and strong official bank supervision.

The main conclusions achieved by this thesis are the following:

(1) Banks behave in the same way as firms in general, facing similar agency problems and using similar corporate governance mechanisms.

(2) Capital regulations have a beneficial role in attaining bank efficiency from both the systemic perspective of regulators, who seek to attain financial stability, and the perspective of the bank's shareholders, who want to improve performance.

(3) There are complex interactions between the different types of bank regulations that try to influence the risk taking behaviour in banks´ lending policies. It is too simplistic to assume that these regulations are complements, as advocated by proponents of reinforcing pillars of Basel II.

(4) Regulations that promote the external private monitoring of banks increase the sensitivity of market reactions on bank stocks' prices following banks' risk taking decisions. Thus, stock markets reward, through increasing bank equity value, good news in terms of sound bank lending, and induce, through market reactions, the pursuing of sound lending practices on the part of banks' managers.

RESUMEN

La existencia de los bancos como intermediarios financieros y el funcionamiento del sistema bancario están considerados como de gran importancia para la determinación del crecimiento y de la estabilidad económica de un país. Atentos al papel importante que juegan las instituciones financieras para la economía, los gobiernos y otras instituciones nacionales en todo el mundo imponen una serie de regulaciones al sector bancario. En particular, la existencia de regulaciones que limitan la acción de los bancos puede hacer que su gobierno corporativo sea distinto del de las empresas no financieras. Además, los bancos son considerados empresas peculiares, no solo por estar intensamente regulados, sino también porque están en media más apalancados y son más opacos que los demás tipos de empresas.

El objetivo de esta tesis doctoral es aportar conocimientos que contribuyan a un mejor entendimiento del funcionamiento de los bancos, proporcionando evidencia empírica de cómo determinadas dimensiones de la actividad bancaria se ven afectadas por mecanismos internos y externos de gobierno corporativo. En concreto, se llevan a cabo tres ensayos diferentes que contribuyen a explicar algunos aspectos de la actividad de los bancos.

En el primer ensayo, se muestra evidencia de la relación entre el riesgo, el resultado de los bancos y su concentración de propiedad, incorporando en el análisis la presencia de regulaciones bancarias y otros factores a nivel de país que afectan a la industria bancaria.

En el segundo ensayo, se ayuda a describir prácticas crediticias de los bancos mediante la evaluación de la importancia relativa de tres conjuntos de regulaciones bancarias como son: (i) los requerimientos de capital, (ii) la supervisión oficial y (iii) la

supervisión por parte de los mercados financieros, en la determinación de las características de riesgo de los préstamos bancarios.

El tercer ensayo muestra evidencia de la efectividad de dos dimensiones de la disciplina de mercado sobre los bancos. En primer lugar, la supervisión del mercado mostrada a través de las reacciones en los precios de las acciones de los bancos a los anuncios de préstamos a empresas. En segundo lugar, la propia respuesta de los bancos a las referidas reacciones del mercado, en el sentido de promover prácticas de riesgo responsables.

Los resultados aportados en los tres ensayos empíricos son obtenidos usando muestras que contienen información de bancos localizados en un amplio conjunto de países, así como medidas de regulaciones bancarias y otras características a nivel de país. El primer ensayo utiliza una amplia muestra de 4.681 observaciones conteniendo información contable y de estructura de propiedad, generada por un conjunto de 795 bancos comerciales localizados en 47 países, en el periodo de 1997 a 2007, para investigar la influencia de la concentración de la propiedad, de las regulaciones bancarias y del nivel de protección legal de los accionistas, en el riesgo y el resultado de los bancos. La metodología empleada consiste de la técnica de estimación de panel dinámico de datos llamada "*Generalized Method of Moments*" (GMM). El segundo ensayo realiza análisis de regresiones del tipo "*Ordinary Least Square*" (OLS) sobre una muestra de 46.453 préstamos concedidos por 278 bancos comerciales de 39 países, durante el periodo de 1998 a 2006, con objeto de explicar cómo la prima de riesgo y la duración (*maturity)* de los préstamos bancarios se ven afectados por regulaciones bancarias y sus interacciones con otros factores a nivel de país. El tercer ensayo utiliza técnicas de estudios de eventos para medir las reacciones de los mercados en los precios de las acciones de 119 bancos localizados en 35 países, a 1.354 anuncios de préstamos

hechos en el periodo de 1998 a 2006. Se utilizan, a su vez, técnicas de regresión estándar para explicar cómo las reacciones están asociadas a las regulaciones que promueven la supervisión de los bancos por parte del mercado.

Las aportaciones que hace esta tesis a la literatura se pueden resumir en los siguientes puntos:

(I) Conectadas con la relación entre propiedad, riesgo y rentabilidad

- La concentración de propiedad y el resultado de los bancos poseen una relación cúbica. Esta relación se explica porque al incrementar la concentración de la propiedad, se reduce el atrincheramiento gerencial para bajos niveles de concentración; se incrementa la expropiación a los minoritarios para niveles medios, y se alinean los intereses de los diferentes accionistas para niveles altos de concentración.

- La concentración de propiedad y el riesgo de los bancos tienen una relación cuadrática, confirmando la hipótesis de que por encima de un umbral de participación accionarial, los incentivos de los accionistas para corregir una situación de aversión al riesgo por parte de la gerencia predominan sobre los intereses de éstos últimos.

- Existe una clara interacción entre la concentración de la propiedad y medidas de regulación bancaria tales como las restricciones de capital, la competencia bancaria y el nivel de protección legal de los accionistas. El resultado bancario se ve influido por la anterior interacción.

(II) Relacionadas con la efectividad de las medidas de regulación bancaria

- Las regulaciones sobre requerimientos de capital son efectivas simultáneamente en reducir el riesgo y mejorar el resultado de los bancos.

- La intensidad en los requerimientos de capital reduce el riesgo sólo a partir de un determinado umbral.

- La regulación asociada a la mejora de la supervisión oficial de los bancos incrementa el riesgo en lugar de reducirlo.

- La supervisión por parte de los mercados financieros sobre los bancos complementa la regulación sobre restricciones de capital como mecanismo para reducir el riesgo en la actividad crediticia de los bancos.

- Los grados adecuados de desarrollo financiero, eficacia del sistema legal, y competencia en la industria bancaria de un país, son mecanismos que mejoran la efectividad de las regulaciones asociadas a los requerimientos de capital así como a la supervisión por parte de los mercados para reducir el riesgo de los préstamos bancarios.

(III) Conectadas con la relación entre disciplina de mercado y política crediticia de los bancos

- Los retornos anormales de las acciones de los bancos son significativos en los días próximos a un anuncio de préstamo, siendo que los retornos positivos son mayores y más frecuentes en países donde las regulaciones que promueven la supervisión del mercado sobre los bancos están más desarrolladas, mientras que los retornos negativos son mayores y más frecuentes donde tales regulaciones son poco desarrolladas. Esto ratifica la idea de que más regulaciones que promuevan la supervisión del mercado sobre los bancos (tales como divulgación obligatoria de estados contables y otras informaciones, auditoría externa, protección de depositantes, deuda subordinada y disciplina) mejorarían la calidad de las señales de mercado, e inducirían a los gerentes de los bancos a que implementasen mejores prácticas crediticias.

- La supervisión del mercado sobre los bancos es especialmente importante en países con sistemas legales o mercados de acciones poco desarrollados, baja concentración de la industria bancaria, o fuerte supervisión oficial sobre los bancos.

Por tanto, de esta tesis podemos extraer las siguientes conclusiones principales:

(1) Los bancos se comportan de forma similar a las empresas no financieras, ya que responden a los mismos problemas de agencia y tienen mecanismos de gobierno corporativo semejantes.

(2) Las regulaciones sobre restricciones de capital tienen un papel beneficioso en la obtención de la eficiencia bancaria, tanto desde la perspectiva sistémica del regulador, que busca la estabilidad financiera, como desde la perspectiva individual de los accionistas de los bancos, que buscan la mejora del resultado.

(3) Ocurren interacciones complejas entre las regulaciones bancarias, más allá de las simples complementariedades defendidas por los proponentes de los tres pilares de Basilea II.

(4) Las regulaciones que estimulan la supervisión externa del mercado sobre los bancos hacen más sensibles las reacciones en los precios de las acciones de los bancos ante cambios en la política bancaria que supongan variaciones en el riesgo bancario. De esta forma, dichas regulaciones recompensan mediante ganancias de capital las buenas noticias relacionadas con la actividad crediticia de los bancos, e inducen, a través de las reacciones en los precios de las acciones, a la realización de buenas prácticas crediticias.

Contents

Chapter One

General Introduction

The existence of banks as financial intermediaries and the functioning of the banking system are argued to be of great importance in determining a country's economic growth and stability (Allen and Gale, 2000; Levine, 2006). Governments and national institutions all over the world are aware of the important role played by financial institutions and impose several regulations on the banking sector. More formally, Santos (2001) summarizes that the need for bank regulations is grounded on two basic reasons: first, the risk of a systemic crisis that would spread along all the economy; second, the inability of depositors to monitor banks.

Despite the substantial regulation that has been imposed on the banking industry, financial firms have received little research effort on key aspects of their functioning. For instance, John and Qian (2003) observe that, although an increasing literature has examined various aspects of the corporate governance of manufacturing firms in the United States and abroad, the corporate governance of banks and financial institutions has received relatively less focus. In the same line, Gorton and Whinton (2003) verified

that corporate governance issues in financial intermediaries and the intersection of governance and alleged incentives for moral hazard have yet to be fully explored. In addition, more research is needed on how legal, regulatory, and supervisory policies influence the governance of banks, according to Levine (2003).

Remarkably, the existence of regulations constraining the action of banks may make the corporate governance of these institutions different from non-financial firms. However, the debate whether banks are different from non-financial firms is far from conclusive and goes back to Fama (1985)'s famous question: *"What's different about banks?"*. On the one hand, some authors (Macey and O'Hara, 2003; John and Qian, 2003; Levine, 2003) argue that banks are different because they are heavily regulated, highly levered and more opaque than non-financial firms. On the other hand, authors like Caprio *et al* (2007) find that "*the same core corporate control mechanisms that influence the governance of non-financial firms also influence bank operations.*".

The purpose of this thesis is to contribute to a better understanding of the functioning of banks, by providing empirical evidence of how specific dimensions of bank activity are affected by internal and external corporate governance mechanisms. Specifically, three different essays are conducted in order to help explain banks' outcomes. In the first one, we offer evidence that better characterizes banks when compared to non-financial firms, by studying the influence of ownership concentration on both the risk and performance of banks, in the presence of broad bank regulations and other country-level conditions that shape bank industry. In the second one, we help to characterize bank lending practices through the assessment of the relative importance that three different types of broad bank regulations (capital requirements, official supervision and external private monitoring) have on the determination of loan contracts terms (spread and maturity). In the third essay, we provide evidence of the market

monitoring of banks through equity markets' price reactions to loan announcements, as well as evidence of banks' responses to these market reactions in the direction of pursuing sound risk-taking practices. A general overview of each of these essays, which are presented in Chapters 2 through 4, and discussion of the overall conclusions that can be drawn from the thesis are presented bellow.

In the first essay, that corresponds to Chapter 2, we shed new light to the debate whether banks are different or not from non-financial firms by analyzing the connection of banks' ownership structure with both risk and performance. We derive four empirical hypotheses to be tested, taking as the starting point the traditional risk shifting theoretical hypothesis, according to which shareholders in a limited liability firm have incentives to increase risk (Galai and Masulis, 1976; Esty, 1998). Then, we incorporate theoretical predictions from agency theory stating how the risk and performance of firms are affected by conflicts of interests between managers and shareholders (Jensen and Meckling, 1976), and conflicts of interest between controlling and minority shareholders (Shleifer and Vishny, 1986; Faccio and Stolin, 2006). Our hypotheses also accommodate the prediction of Burkart *et al*. (1997), who argue that excessive monitoring can result in the loss of managerial discretion and this may hinder banks' performance and optimal risk levels. We also take into account the idea that expropriation in general is costly (Burkart *et al*., 1998), and this inhibits expropriation by controlling shareholders for highly concentrated ownership structures. Finally, we allow for the influence of bank regulations and shareholders' protection laws and their interactions with ownership concentration on banks' risk and performance, to derive some contentions that rely on authors like Shleifer and Wolfenzon, (2002) John *et al. (*2000); Caprio *et al.*, (2007), Claessens *et al.* (2000) and La Porta *et al.*, (2002). To test our hypotheses, we make use of a sample of 4,681 bank-year observations of ownership

and accounting information produced by a set of 795 commercial banks located in 47 countries, in the period from 1997 to 2007. This database allows the use of dynamic panel data estimation techniques to control for endogeneity problems that emerge naturally in the ownership-performance analysis (Coles *et al.*, 2006, 2007). We perform the analysis employing the so-called Generalized Method of Moments (GMM), proposed by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998). The estimation techniques used in the analysis, as well as the comprehensiveness of our sample, which includes not only large, but also medium and small commercial banks across a large set of countries observed in a 11-year period, is a distinctive feature of our study in comparison with others like Laeven and Levine (2006) and Caprio et al. (2007).

In the context of the heavy regulations imposed on the banking industry all over the world, which is argued to differentiate banks from non-financial firms, Chapter 3 is devoted to examine how diverse regulations grouped in three broad concepts, namely capital requirements, official supervision and private monitoring, influence the risk characteristics of syndicated loan contracts (spread and maturity). There are three important motivations for undertaking this study: (i) The lack of consensus of the theoretical and empirical research on the effects of capital regulations on bank solvency and risk taking (VanHoose, 2006); (ii) the scarcity of evidence on the effects of supervision on bank lending and risk taking, and (iii) the little research effort dedicated to analyze joint interactions among the three regulatory mechanisms and to develop the second and third pillars of Basel II Capital Accord (Basel Committee, 2004).

The analysis of Chapter 3 builds on the empirical work of Barth *et al* (2006), who seek to achieve a better understanding of the forces influencing bank regulatory and supervisory choices. However, besides having a much more limited scope than that

study, our approach differs from their country-level approach by using transaction-level data across countries. Our study relies on the cross-country surveys on bank regulation and supervision performed by Barth *et al.* (2001, 2006, 2008) as its source of data on bank regulations. We use the broad indices proposed by those same authors (Barth *et al.*, 2006, chapter 4) to measure the country's degree of adoption of bank regulations regarding capital requirements, official supervision and private monitoring. The adoption of these indices is intended to reflect the widely consensual Basel II's general framework of structuring bank regulation and supervision in the three pillars of risk-based capital requirements, supervisory review and market discipline. The indices are merged to a sample of 46,453 loans extended by 278 large commercial banks of 39 countries, during the period from 1998 to 2006. Then, we perform OLS regression analysis in order to help explaining how spread and maturity of loan contracts are affected by bank regulations. Furthermore, given the comprehensiveness of our dataset, we are able to extend our analysis by examining complementarities and interactions between bank regulatory mechanisms themselves and between these and country factors such as the levels of bank competition, financial development and legal enforcement.

It is a well established result that capital markets may play a role in shaping the risk-taking behaviour of banks. Bank regulatory authorities and committees on bank regulation around the world (e.g. the Basel Committee on Bank Supervision and the US and European Shadow Financial Regulatory Committees) are aware of this issue and recommend the implementation of appropriate mechanisms promoting bank transparency and market discipline on banks. Nevertheless, there is not a consensus on the appropriate degree of reliance that should be placed on market discipline as a bank supervisory mechanism. In fact, Flannery (2001) remarks that the available empirical work is inconclusive on whether the market does a better or a worse job than the

regulator in assessing bank quality. Chapter 4 concentrates on the market discipline dimension of bank regulation to offer empirical evidence on the effectiveness of the two stages that drive the process of market discipline of banks, in a context of equity markets reactions to bank loan announcements.

According to the frameworks of Flannery (2001) and Hamalainen *et al.* (2005), the first stage of market discipline is the "market monitoring" or the "recognition phase", and refers to the situation where 'investors accurately evaluate changes in a firm's condition and incorporate those assessments promptly into security prices' (Flannery, 2001, p. 110). The second stage is referred as "market influence" or the "control phase", and consists of 'the process by which outside claimants influence a firm's actions' (Flannery, 2001, p. 110). We adhere to this two-stage process of market discipline and seek to make a contribution to the literature by analyzing our results in the light of this framework. The literature has identified four necessary conditions for market discipline to occur, according to Hamalainen *et al.* (2005). Three conditions are associated to the recognition phase: first one is the existence of unrestricted and efficient capital markets; second condition refers to the public disclosure of bank capital structure and risk exposures; third condition states that market participants must not believe that the borrower would be bailed out in the case of an actual or impending default. The remaining condition refers to the control phase, and it is simply that banks must respond to market signals produced in the recognition phase, in a manner consistent with their solvency.

Chapter 4 employs event-study techniques to assess market reactions in stock prices of 119 banks located in 35 countries to 1,354 loan announcements made in the 1998-2006 period. Then, we employ OLS regression analysis to explain how price reactions to loan announcements are conditioned by the country's degree of adoption of

regulations that promote the external private monitoring of banks. The variable measuring such degree is an index proposed by Barth *et al*. (2006) that assesses the existence of regulatory requirements of information and accounting disclosure, external auditing, depositor protection, use of subordinated debt, and discipline. Other country-level and bank-level variables are added to the bank regulations and loan-level information to construct a cross-country setting appropriate to the assessment of the role of private monitoring regulations on abnormal returns .

Among the conclusions achieved by the empirical essays, we emphasize the following: (1) banks behave in the same way as firms in general, as they face similar agency problems and use similar corporate governance mechanisms to solve them; (2) capital regulations, bank competition and shareholders protection laws interact with ownership concentration to influence the performance of banks; (3) capital regulations have a beneficial role in attaining bank efficiency, both from the systemic perspective of regulators, who seek to attain financial stability, and the perspective of shareholders, who want to improve performance; (4) adequate levels of financial development, law enforcement, and competition in the banking industry, are mechanisms that make capital regulations more effective in reducing the risk of loan contracts; (5) although, by itself, external private monitoring on banks increases the risk of loan contracts, its interaction with both capital regulations stringency and banking competition highlights its importance as a complementary mechanism in the reduction of the risk of lending; (6) the different types of bank regulations aimed at influencing the risk taking behaviour of banks are not simple complements, as advocated by proponents of reinforcing pillars of Basel II, and there are complex interactions among them; (7) bank regulations that promote the external private monitoring of banks – e.g., regulatory requirements of information and accounting disclosure, external auditing, depositor protection, use of

subordinated debt, and discipline – play a role in influencing bank stock market reactions to banks' risk taking decisions; (8) stock markets react positively to good news related to sound bank lending, with intensity proportional to the degree of implementation of regulations that promote the private monitoring of banks; (9) regulations promoting the private monitoring of banks induce, through enhanced market reactions, the pursuing of sound lending practices on the part of banks' managers.

Chapter 5 makes a general conclusion of this thesis, highlighting the main findings, contributions and implications achieved by the studies, as well as proposing lines for future research.

Finally, despite the related issues covered by the three essays, we clarify that Chapters 2, 3 and 4 are independent studies, in the sense that each of them consists of a complete empirical research that conveys independent conclusions, and is conducted on its own specific setting, specially designed for its purposes. As consequence, each of these chapters can be read separately.

Chapter Two

Banks' Ownership Structure, Risk and Performance

2.1 Introduction

The study of risk and performance of banks is of great relevance, since banks' investment decisions are argued to influence economic growth and stability (Allen and Gale, 2000; Levine, 2006). Too little bank risk taking may hinder economic growth, whereas too much bank risk threatens economic stability. Hence, it makes sense for governments and institutions to regulate banks with the purpose of shaping and influencing bank risk taking and performance and attain economic growth and stability.

Remarkably, the existence of regulations constraining the action of banks may make the governance of these institutions different from non-financial firms' corporate governance. However, the debate whether banks are different from non-financial firms is far from conclusive and goes back to Fama (1985)'s famous question regarding *"what's different about banks?"*. On the one hand, some authors (Macey and O'Hara, 2003; John and Qian, 2003; Levine, 2003) argue that banks are different because they

are heavily regulated, highly levered and more opaque than non-financial firms. On the other hand, authors like Caprio *et al* (2007) find that "*the same core corporate control mechanisms that influence the governance of non-financial firms also influence bank operations.*".

This chapter tries to shed new light to this debate by analyzing the connection between banks' ownership structure and risk as well as performance using a rich database of 795 banks from 47 different countries for the period from 1997 to 2007. This database allows the use of dynamic panel data estimation techniques to control for endogeneity problems that emerge naturally in the ownership-performance analysis (Coles *et al.*, 2006, 2007). Specifically, we first search for empirical evidence of linear and/or non-linear effects of ownership concentration – measured through the main shareholder's equity holdings - on risk and performance of banks. Second, we examine the influence of country-specific shareholders protection laws and bank regulations on risk and performance of banks.

Concerning bank performance, we do find evidence of a cubic relationship between ownership concentration and bank performance (positive, negative and positive). Such evidence is supportive of theoretical hypotheses of monitoring effect at low ownership concentration, expropriation or loss of managerial discretion effects from moderate to high ownership concentration, and high costs (and absence) of expropriation at very high concentrated ownership. A similar cubic relationship between performance and insider ownership was found by Morck *et al.* (1988) for non-financial firms.

Concerning bank risk taking, we find evidence of a U-shaped relationship between earnings volatility and ownership concentration. For main shareholder's equity stakes of 25% and above, bank risk taking increases with ownership concentration. This

finding supports the argument that shareholder's incentive to take risk prevails when her equity stake in the bank is above a threshold. Also, we found a positive linear effect of ownership concentration on risk for small banks. Unlike Laeven and Levine (2006), we did not find the same evidence for large banks. Still regarding bank risk taking, we find that ownership concentration increases the risk of banks located in countries where legal protection of shareholders is more developed.

Regarding shareholders' protection laws affecting bank performance, we find that they interact with ownership concentration to influence the performance of banks with dispersed ownership structure. For this sub-sample of banks, our evidence is that increasing ownership concentration is more important to increase bank performance when protection of shareholders is low. Such evidence is very similar to the one Caprio et al. (2007) find for large banks. Turning to bank regulations, we find that ownership concentration is more important to increase the performance of banks with dispersed ownership structures when either capital regulations are stricter or competition in the bank industry is stronger.

The rest of the chapter is structured as follows. Section 2.2 summarizes the most relevant literature akin to the objectives of this work. Section 2.3 describes the sample, variables and empirical models to be tested. The methodology employed in the empirical analysis performed is in Section 2.4. The results obtained are presented in Section 2.5. In the final section of the chapter, we lay out the main conclusions of this research and discuss the significance of our results.

2.2 Theoretical context

To examine banks' risk taking behaviour, we first rely on the traditional risk shifting theoretical hypothesis, by which shareholders in a limited liability firm have incentives to increase risk (Galai and Masulis, 1976; Esty, 1998), as they can experience unlimited gains, but no losses. Therefore, if managers act in the interests of shareholders, in principle they should seek to maximize shareholders' wealth, by choosing to undertake the riskier projects available. Of course, such risk shifting behaviour is detrimental to creditors' interests, unless these are able to effectively monitor managers. In the case of banks, the study of risk shifting is of special relevance, as banks are in general higher levered when compared to non financial firms, which means banks' shareholders may experience incentives to shift high levels of risk. According to agency theory, risk taking behaviour is influenced by conflicts between managers and shareholders (Jensen and Meckling, 1976). Instead of maximizing shareholders' wealth, managers can pursue their own interests, by enjoying private benefits of control or preserving specific acquired human capital (Demsetz and Lehn, 1985; Kane, 1985). In addition, managers bear the specific risk of the firms they manage, and for such they are expected to be more risk averse than shareholders with a diversified investment portfolio. Thus, if no mechanisms to align the interests of managers to the ones of shareholders are present, such as executive compensation contracts or effectively monitoring of managerial actions, managers would have incentives to take low levels of risk. Therefore, a firm controlled or actively monitored by shareholders is expected to take more risk than a firm where managers' individual interests prevail. By these same arguments, a shareholder that participates in the management of the firm would experience opposite risk incentives, suggesting that such

shareholder would have an attitude to take less risk than a shareholder not involved in management. Another mechanism to solve the conflict of interests between shareholders and managers is the equity ownership by managers (Jensen and Meckling, 1976; Fama and Jensen, 1983). By such mechanism, interests of shareholders and managers converge as managers' shareholdings increases, resulting in more risk taking. However, increasing levels of managers' equity ownership may provide them with voting power sufficient to pursue personal objectives, resulting in less risk taking, expropriation of shareholders, and entrenchment.

Incentives to risk taking are also influenced by ownership structure, investor protection laws and bank regulations. Conflicts of interests between managers and shareholders are argued to be more important in firms with dispersed ownership structures, as coordination problem hinders effectively monitoring of managerial actions by small shareholders, who have to rely on external monitoring through the market for corporate control (Fama and Jensen, 1983; Jensen, 1988). By contrast, conflicts between managers and shareholders are expected to be less important in firms with concentrated ownership structure, as controlling shareholders have strong incentives to monitor managers, and even replace them in the case of poor performance (Franks *et al*, 2001). Because shareholders' interests are likely to prevail in firms in which the ownership concentration is high enough, we expect these firms take more risk than ones with a dispersed ownership structure. The considerations made by Burkart *et al*. (1997), however, point that as the monitoring effort exerted by a large shareholder increases, managerial initiative to pursue new investment opportunities decreases. In other words, too much monitoring reduces managers' initiative to seek firm-specific investments, which is detrimental to firm value. This can be translated in terms of less risk taking by

managers at least when ownership concentration is not too high. These arguments lead to the first hypothesis to be tested in this study:

Hypothesis 1: Bank risk taking is low at low to moderate levels of ownership concentration, when managers' interests prevail and/or there is loss of managerial discretion, and bank risk taking increases with levels of ownership concentration above the threshold where shareholders' interests prevail.

In addition, investor protection laws and banking regulations can also play a role in shaping the risk taking attitude of banks. Some studies point that a legal system that protect small shareholders can substitute for the existence of a large shareholder that monitors management (Shleifer and Wolfenzon, 2002; John *et al.*, 2000; Caprio *et al.*, 2007). Therefore, the role of a large shareholder in increasing risk taking by managers is expected to be more important in countries without effective legal protection of shareholders. Finally, banking regulations aimed to avoid financial instability can affect banks' risk taking behaviour. Despite the considerable empirical research on how ownership structure and other corporate governance factors affect financial institutions' risk taking behaviour[1], evidence on the relationship between ownership structure and bank risk in the presence of other country-level governance mechanisms is scarce. Only the study of Laeven and Levine (2006) analyzes the relationship between bank risk taking and ownership structure, legal protection of investors and banking regulations across a large set of countries. Thus, our second hypothesis to be tested is as follows:

[1] Saunders *et al.* (1990); Anderson and Fraser (2000), Brewer and Saidenberg (1996), Chen *et al*. (1998), Demsetz *et al*. (1996) Demsetz and Strahan, 1997; Knopf and Teall, 1996; Cebenoyan *et al*. (1999), Gorton and Rosen (1995), Sullivan and Spong (1998, 2007).

Hypothesis 2: The relationship between ownership concentration and risk is reinforced if the country's levels of shareholder legal protection, banking regulations promoting financial stability, or other country governance mechanisms are underdeveloped.

The second element for evaluating bank's efficiency is its performance. Then, it is also of interest to understand how banks' performance is related with ownership structure, legal investor protection and bank regulations. Such issue, although linked to the previous risk taking discussion, deserves a separate investigation, as it may provide conclusions regarding bank corporate finance efficiency. There is little empirical evidence on the issue, contrasting with the extensive research available on the relationship between corporate performance and ownership structure of non financial firms (for a review, see Miguel *et al.,* 2004). As previously argued, monitoring of managerial actions is difficult in a firm with dispersed ownership structure. On the contrary, a concentrated ownership structure providing effective monitoring in principle is expected to enhance firm performance. However, another potential conflict of interests arises in firms with concentrated ownership, as the controlling shareholders may engage in activities that expropriate minority shareholders (Shleifer and Vishny, 1986; Faccio and Stolin, 2006). Therefore, concentration of ownership may also have a negative impact on corporate performance, due to expropriation of minority shareholders by controlling shareholders. Thus, these theoretical hypotheses of monitoring and expropriation have opposite predictions regarding the relationship between ownership concentration and performance. In their model for the role of large shareholders, Burkart *et al*. (1997) challenge the view that monitoring is purely beneficial, by describing a trade-off between the benefits of monitoring and the ones of

managerial discretion. As previously stated, the excess of monitoring may be detrimental to firm value, as it reduces managers' initiative to seek firm-specific investments. They propose the ownership structure as a commitment device to delegate a certain degree of control to management. The mentioned theories suggest that a non linear relationship between ownership concentration and firm performance is possible. In fact, Miguel *et al* (2004) predict and find empirical evidence of a quadratic relationship, in which performance (firm value) increases at low levels of ownership concentration (due to the monitoring effect), and decreases at high levels (as a result of the expropriation effect). However, relying also on the theoretical argument that expropriation in general is costly (Burkart *et al*., 1998), we should expect less severe expropriation in a high concentrated ownership structure. Therefore, a cubic relationship between ownership concentration and performance is possible. We propose the following hypothesis to be tested:

Hypothesis 3: Bank performance increases with ownership concentration at low levels of concentration due to effective monitoring by shareholders, decreases at intermediate levels of concentration due to expropriation of minority shareholders and/or less managerial discretion, and increases at high levels of concentration due to disincentives to internalize high costs of expropriation.

According to Miguel *et al*. (2004), there is no previous empirical evidence of the proposed hypothesis. Performance or firm value is also argued to increase in the presence of strong shareholder protection laws aimed to avoid expropriation by controlling owners (Claessens *et al.*, 2000; La Porta *et al.*, 2002). Therefore, the effectiveness of shareholder protection laws affects the relationship between ownership

structure and performance. The unique characteristics of banks, however, may interfere in such relationship, as argued by Caprio *et al.* (2007). First, due to the higher opacity and complexity of banks (Morgan, 2002), investor protection laws alone may not provide effective protection to small shareholders. Second, heavy regulations imposed on banks may substitute for, or interfere with investor protection laws, or make these latter superfluous. As a consequence, it is not clear that we should expect a positive impact of investor protection laws on banks' performance and valuation, as it is the case for non financial firms. In addition, given the uniqueness of banks, regulations themselves may interfere in the relationship between ownership concentration and performance, rendering banks different from non-financial firms. In principle, the focus of bank regulations is to attain financial stability, but the issue of whether bank efficiency is also improved as a consequence of bank regulations is important. Finally, we can expect that other country level mechanisms such as competition in the banking industry may interact with, complement or substitute ownership concentration in inducing banks' managers to attain performance. In order to investigate the influence of banks' peculiarities on performance, we propose a last hypothesis to be tested:

Hypothesis 4: The country's levels of implementation of legal protection of shareholders, bank regulations and other governance mechanisms, strengthens the relationship between banks' ownership structure and performance.

With the purpose of providing a broader picture of how risk taking and expropriation incentives are shaping banks' performance, this chapter analyses how both risk and performance are affected by ownership concentration, investor protection laws and bank regulations. It has similarities with the studies of Laeven and Levine

(2006) and Caprio et al. (2007), both in purposes and in the cross country coverage of the databases used. However, it differs from those in three aspects. First, our database comprises not only large and often publicly listed banks, but also medium, small and not listed commercial banks around 47 countries out of the 49 ones for which La Porta *et al*. (1998) report data on legal protection of shareholders. As noticed by La Porta *et al.* (2002) and recognized by Caprio *et al.* (2007), focusing on largest firms makes it harder to find a relationship between investor protection and firm value because large corporations have alternative governance mechanisms for limiting expropriation of minority shareholders, such as public scrutiny, reputation-building, foreign shareholdings, and listing on international exchanges. Second, our risk analysis relies on the volatility of earnings as the relevant measure of risk, instead of Z-Score as in Laeven and Levine (2006). Our belief is that Z-Score is rather a measure of stability, which may not convey a correct picture of bank risk taking behaviour. Last, the methodology used for both risk taking and performance analyses is based on panel data. More specifically, we perform dynamic panel data estimations through the Generalized Method of Moments. We believe that panel data analysis is able to control for omitted variables and endogeneity, an important issue when jointly analyzing ownership structure and performance (Coles *et al*., 2007).

2.3 Data description

A sample of banks around the world is drawn from the *Bankscope* database. The countries selected to conduct the cross country panel data studies are the ones for which La Porta *et al*. (1998) report data on legal protection of shareholders (except New Zealand, as most banks there are owned by Australian banks). Such selection of

countries also allows comparability with the studies of Laeven and Levine (2006) and Caprio *et al.* (2007). Departing from an initial database of all commercial banks from the 48 selected countries, we collected available annual data on largest owner's shareholdings and on accounting numbers for the period from 1994 to 2007. To avoid duplicity of data, while keeping as many observations as possible, only unconsolidated statements were considered when collecting accounting data. To avoid redundant data, banks which the largest owner is another bank in the same country with at least 10% of shareholdings were excluded from the sample. Risk and performance variables were generated using standard deviations over a moving window of four years, which reduced the time dimension of the panel to the period from 1997 to 2007. Then, the sample was again reduced after generating other bank-specific variables and deleting multivariate outliers using the Hadi and Simonoff (1993) method. Finally, due to methodological issues (explained in Section 2.4), we excluded banks for which the ownership concentration variable has null variance and banks with less than 3 years of observations. We ended up with an unbalanced panel of 795 banks located in 47 different countries that correspond to 4,681 bank-year observations distributed in the 1997-2007 period[2]. All regressions in this study were performed on such panel, or on sub-samples of it.

2.3.1 Dependent variables

Risk

Earnings Volatility: it is the risk measure from which the main results concerning bank risk taking are derived and it consists of the standard deviation of the

[2] Canada ended up with no observations, mainly because banks there experienced no volatility in largest shareholder's equity participation in the period of analysis.

ratio of total earnings before taxes and loan loss provisions to average total assets, computed over a moving window of 4 years. By using data from years 1994 to 2007, we were able to compute earnings volatility for the 11-year period from 1997 to 2007. Source: calculations on data from *Bankscope*.

Z-Score: it is a ratio where the numerator is the sum of return on assets and the capital to asset ratio, while the denominator is the standard deviation of return on assets computed over a moving window of 4 years (e. g., see more of Z-Score in Boyd *et al*., 1993). Return on assets is the ratio of pre-tax profits to total assets. It is often referred as a measure of firm stability (or distance to default). Source: calculations on data from *Bankscope*.

Performance

Risk-Adjusted ROA: the bank's ratio of return on average assets before taxes to the standard deviation of this same return. The standard deviation is computed over a moving window of 4 years. Source: calculations on data from *Bankscope*.

2.3.2 Explanatory variables

Explanatory variables used to explain bank risk and performance are grouped in two sets: bank specific and country specific variables. First set includes a measure of ownership concentration, given by the equity participation of the largest shareholder, and other controls at the bank level. Second set includes bank regulations and measures of legal and economic development of the countries where banks are established. Bank regulations variables are indices representing three broad regulations: capital requirements stringency, official supervisory power, and regulations promoting the private monitoring of banks. The rationale behind choosing these indices is to represent the concepts underlying the approach of three reinforcing pillars adopted by Basel II

(Basel, 2001), although such indices do not measure adherence to Basel II. They were constructed following Barth *et al*. (2006) for three periods (1997-2000, 2001-2003 and 2004-2007), using data from three surveys on bank regulation and supervision conducted by the *World Bank* (Barth *et al*., 2001, 2006, 2008). Additional country specific variables are the level of legal protection of shareholders, as well as the enforcement of law, and measures of the country's financial and economic development. Finally, two proxies of competition in each country's banking industry are included. A detailed description of each explanatory variable used in this study is provided in Appendix A. As required by the regression techniques used in this study, year dummies are also included as explanatory variables in all regressions.

2.3.3 Descriptive statistics

Table 2.1 reports the descriptive statistics of the variables in the selected panel (4,681 observations, 795 banks). We notice that ownership concentration variable has a mean of 58.72%, which is relatively high. Mean leverage is at 89.36%, a value that supports the view that banks are highly levered (Macey and O'Hara, 2003; John and Qian, 2003; Levine, 2003).

Table 2.2 shows mean values of bank-level variables by country, whereas Table 2.3 shows means of country-specific variables. Given the diversity of countries included in the sample, Tables 2.1, 2.2 and 2.3 shows that heterogeneity observed on both dependent and explanatory variables across observations and countries is appropriate for conducting an econometric analysis.

Table 2.1 – Descriptive Statistics
(Panel with 4,681 observations of 795 banks around 47 countries, in the 1997-2007 period)

Variable	*Mean*	*Std. Deviation*	*Minimum*	*Maximum*	*Percentile 10%*	*Percentile 25%*	*Median*	*Percentile 75%*	*Percentile 90%*
Earnings Volatility ($x10^2$)	0.98	1.83	0.00	40.88	0.12	0.22	0.44	1.02	2.29
Z-Score	38.99	118.83	-5.02	5583.42	3.88	9.21	20.40	41.40	75.55
Risk-Adjusted ROA	3.16	3.83	-7.76	25.59	-0.13	0.56	2.40	4.47	7.60
Own. Concentration (%)	58.72	35.56	0.01	100.00	5.01	27.30	57.76	99.21	100.00
Revenue Growth	0.13	0.41	-2.01	2.46	-0.23	-0.06	0.09	0.27	0.56
Total Assets (bn USD)	15.50	68.20	0.01	1680	0.13	0.35	1.35	6.87	29.00
Leverage (%)	89.36	8.51	43.02	118.72	78.75	87.50	92.06	94.59	96.12
State Owned	0.06	0.24	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Capital	6.42	1.67	2.00	10.00	5.00	5.00	6.00	7.00	9.00
Official	10.80	2.35	4.00	14.00	8.00	8.00	11.00	13.00	14.00
Private Monitoring	7.98	1.22	5.00	11.00	6.00	7.00	8.00	9.00	9.00
Shareholders Rights	0.43	0.18	0.08	1.00	0.27	0.28	0.41	0.52	0.68
Rule of Law	0.83	1.00	-1.67	2.04	-0.78	-0.04	1.30	1.68	1.86
Log (GDP)	6.16	1.47	0.62	9.55	4.44	5.16	5.97	7.55	8.27
Log (GDP per capita)	9.25	1.48	5.06	11.19	6.77	8.15	10.02	10.41	10.55
GDP growth	3.06	3.04	-13.13	21.18	0.25	1.31	2.86	4.56	6.27
Bank Concentration	0.59	0.19	0.21	1.00	0.35	0.42	0.59	0.71	0.86
Number of Banks	542	1319	8	10,500	26	52	190	342	907
Country-Average ROA	1.15	2.35	-26.76	23.39	-0.09	0.62	1.23	1.91	2.72

Table 2.2 – Country Descriptive Statistics (Mean of bank-specific variables)

Country	*Obs*	*Banks*	*Earnings Volatility (10^2)*	*Risk-Adjusted ROA*	*Z-Score*	*Own. Conc. (%)*	*Revenue Growth*	*Total Assets (bn USD)*	*Lever (%).*	*State Owned*
ARGENTINA	168	35	3.58	0.95	11.23	72.89	0.17	1.13	83.62	0.20
AUSTRALIA	80	10	0.27	5.66	36.30	20.66	0.13	54.60	93.51	0.00
AUSTRIA	141	21	0.75	5.24	47.40	65.37	0.20	2.70	89.83	0.00
BELGIUM	88	13	0.54	3.10	24.79	92.03	0.16	10.80	92.76	0.00
BRAZIL	256	48	2.57	2.14	14.25	75.26	0.14	6.95	85.30	0.16
CHILE	64	10	0.33	6.17	40.90	66.67	0.13	5.52	90.87	0.00
COLOMBIA	74	12	1.48	1.57	15.31	73.35	0.09	2.13	86.96	0.07
DENMARK	141	23	0.34	4.81	36.42	34.23	0.11	11.90	89.28	0.00
ECUADOR	38	6	2.05	2.57	18.20	55.48	0.19	0.51	88.51	0.00
EGYPT	113	17	0.53	3.48	38.80	54.49	0.11	1.72	91.16	0.00
FINLAND	12	2	0.41	5.38	31.06	15.48	0.08	1.60	94.13	0.00
FRANCE	414	75	0.81	3.15	47.24	77.91	0.12	25.30	87.74	0.00
GERMANY	548	75	0.54	2.93	89.68	70.40	0.09	30.70	91.23	0.07
GREECE	63	10	0.83	2.17	18.34	44.69	0.22	14.50	92.02	0.00
HONG KONG	20	3	0.50	5.02	46.70	69.53	0.02	4.89	82.93	0.00
INDIA	175	32	0.58	3.31	17.10	61.45	0.19	7.35	94.80	0.42
INDONESIA	195	34	2.06	3.42	23.97	61.96	0.18	1.33	86.22	0.02
IRELAND	34	5	0.13	4.41	53.60	94.60	0.17	6.23	91.52	0.00
ISRAEL	56	8	0.22	3.14	36.91	46.85	0.10	19.50	92.71	0.14
ITALY	29	8	0.39	2.69	39.06	72.75	0.17	12.30	87.00	0.00
JAPAN	391	77	0.34	1.36	29.42	7.11	0.01	33.90	95.29	0.00
JORDAN	20	4	0.43	6.16	42.99	20.95	0.16	6.09	91.03	0.00
KENYA	44	8	0.97	4.38	37.60	41.16	0.04	0.14	84.30	0.07
SOUTH KOREA	62	12	1.00	1.48	12.16	38.51	0.24	44.80	94.64	0.15
MALAYSIA	44	7	0.47	4.59	30.63	50.72	0.19	10.90	90.73	0.00
MEXICO	6	2	2.17	2.26	14.88	100.00	0.37	15.30	78.31	0.00
NETHERLANDS	22	5	0.24	4.68	49.78	77.59	0.28	1.95	91.56	0.00
NIGERIA	81	15	1.21	3.49	15.01	51.68	0.20	0.59	88.06	0.00
NORWAY	31	5	0.33	2.31	18.69	49.68	0.11	10.20	92.47	0.00
PAKISTAN	97	17	0.74	3.80	20.53	58.28	0.20	1.29	93.35	0.12
PERU	28	6	0.70	3.14	27.46	77.66	0.17	3.13	89.94	0.00
PHILIPPINES	57	10	0.76	2.90	35.39	42.86	0.08	1.36	85.69	0.00
PORTUGAL	70	11	0.50	3.12	42.35	68.18	0.16	13.20	91.48	0.07
SINGAPORE	14	2	0.32	5.39	41.87	14.05	0.07	38.80	88.78	0.00
SOUTH AFRICA	10	1	1.53	-0.25	6.83	88.45	0.04	0.08	91.33	0.00
SPAIN	202	33	0.65	3.82	54.91	69.67	0.11	13.20	88.75	0.00
SRI LANKA	33	5	0.65	4.11	25.30	18.29	0.16	0.67	91.72	0.09
SWEDEN	23	4	0.54	2.38	12.70	33.51	0.03	76.20	95.68	0.17
SWITZERLAND	342	51	1.09	4.72	54.42	77.12	0.14	11.80	79.87	0.04
TAIWAN	104	19	0.34	2.09	31.31	23.94	0.10	12.00	92.84	0.05
THAILAND	75	12	1.21	0.30	6.50	51.73	0.24	11.90	93.51	0.21
TURKEY	37	8	2.92	1.53	7.42	56.40	0.34	10.40	84.65	0.00
UNITED KINGDOM	21	4	0.36	2.71	32.10	55.46	0.07	0.24	86.07	0.00
URUGUAY	39	7	2.96	0.65	9.92	85.23	0.16	0.45	92.37	0.08
USA	81	16	0.37	5.94	43.49	66.85	0.18	12.40	89.95	0.00
VENEZUELA	28	5	2.12	3.20	12.32	42.94	0.24	2.57	86.92	0.00
ZIMBABWE	10	2	2.73	4.61	10.72	40.52	0.63	0.67	91.41	0.00
Whole Sample	4,681	795	0.98	3.16	38.99	58.72	0.13	15.50	89.36	0.06

Table 2.3 – Country Descriptive Statistics (Mean of country-specific variables)

	Country	*Capital*	*Official*	*Private Monit.*	*Sh Rights*	*Rule of Law*	*Fin. Develop*	*GDP per capita*	*Bank Conc. (%)*	*Number of Banks*
1	ARGENTINA	6.7	9.5	8.3	0.44	-0.49	8.31	5,340	41.6	80
2	AUSTRALIA	6.4	11.2	9.7	0.79	1.76	9.70	24,989	77.5	52
3	AUSTRIA	7.2	11.7	6.0	0.21	1.83	6.00	31,720	66.5	911
4	BELGIUM	5.8	10.9	7.0	0.54	1.44	7.00	30,245	83.6	110
5	BRAZIL	6.6	13.7	8.7	0.29	-0.34	8.68	4,074	44.3	180
6	CHILE	5.8	10.8	7.4	0.63	1.17	7.39	5,822	52.4	27
7	COLOMBIA	5.4	13.0	9.0	0.58	-0.80	9.00	2,571	38.7	27
8	DENMARK	7.0	9.0	8.3	0.47	1.87	8.32	37,573	77.7	181
9	ECUADOR	10.0	14.0	9.0	0.08	-0.73	9.00	2,028	60.1	23
10	EGYPT	5.0	13.3	8.7	0.49	-0.06	8.70	1,402	57.0	41
11	FINLAND	4.5	8.0	8.8	0.46	1.89	8.75	32,478	97.3	10
12	FRANCE	6.0	7.4	6.5	0.38	1.34	6.50	29,237	55.7	365
13	GERMANY	6.4	8.6	7.8	0.28	1.71	7.75	29,280	67.3	1,887
14	GREECE	5.1	10.7	7.5	0.23	0.73	7.54	17,393	88.5	28
15	HONGKONG	6.4	11.0	8.7	0.96	1.17	8.70	24,953	63.1	163
16	INDIA	7.6	9.1	6.8	0.55	0.12	6.80	495	34.5	97
17	INDONESIA	6.2	12.6	8.6	0.68	-0.86	8.60	1,091	54.6	145
18	IRELAND	3.9	11.2	8.9	0.79	1.63	8.85	41,807	55.0	52
19	ISRAEL	5.5	8.0	9.6	0.71	0.90	9.57	19,153	73.9	23
20	ITALY	5.0	7.0	8.0	0.39	0.57	8.00	29,828	40.6	797
21	JAPAN	6.1	12.0	9.0	0.48	1.35	9.00	33,739	37.6	234
22	JORDAN	7.7	10.4	7.0	0.16	0.36	7.00	1,933	87.5	20
23	KENYA	7.2	13.3	7.6	0.22	-1.02	7.61	463	56.9	46
24	SOUTH KOREA	4.2	10.8	9.9	0.46	0.73	9.90	13,054	44.4	20
25	MALAYSIA	4.2	11.8	9.0	0.95	0.47	9.00	4,645	42.7	29
26	MEXICO	8.0	9.0	7.0	0.18	-0.47	7.00	5,530	61.1	52
27	NETHERLANDS	5.3	6.5	8.6	0.21	1.75	8.64	34,717	70.5	447
28	NIGERIA	7.9	12.0	7.4	0.52	-1.38	7.36	450	39.8	75
29	NORWAY	6.9	8.7	7.3	0.44	1.93	7.29	46,621	91.9	15
30	PAKISTAN	7.6	13.2	8.2	0.41	-0.82	8.21	572	56.4	38
31	PERU	4.3	12.0	7.0	0.41	-0.66	7.00	2,716	73.8	13
32	PHILIPPINES	5.8	11.4	8.1	0.24	-0.50	8.14	1,053	72.4	44
33	PORTUGAL	7.0	13.7	6.9	0.49	1.16	6.89	14,071	79.8	59
34	SINGAPORE	7.1	8.7	8.9	1.00	1.60	8.86	23,163	91.6	127
35	SOUTHAFRICA	8.5	7.0	9.1	0.81	0.15	9.10	3,901	86.4	49
36	SPAIN	9.6	9.6	8.3	0.37	1.26	8.29	19,316	74.1	287
37	SRILANKA	6.3	8.2	8.3	0.41	0.02	8.30	1,017	66.8	24
38	SWEDEN	3.0	6.4	6.7	0.34	1.82	6.65	32,585	95.5	25
39	SWITZERLAND	6.4	13.7	7.6	0.27	1.98	7.64	43,711	85.8	369
40	TAIWAN	5.5	11.0	8.2	0.56	0.85	8.23	13,830	27.7	39
41	THAILAND	5.6	9.6	8.0	0.85	0.22	7.96	2,256	48.6	27
42	TURKEY	5.8	13.7	7.8	0.43	0.01	7.78	5,870	71.5	53
43	UNITED KINGDOM	6.6	9.9	9.8	0.93	1.73	9.76	31,769	58.4	386
44	URUGUAY	6.0	12.4	9.0	0.17	0.50	9.00	5,817	50.8	19
45	USA	6.7	13.0	9.3	0.65	1.60	9.31	37,503	24.5	8,740
46	VENEZUELA	3.7	12.3	5.3	0.09	-1.05	5.25	4,701	41.5	19
47	ZIMBABWE	5.3	13.8	9.0	0.44	-1.22	9.00	354	69.7	16
	WholeSample	6.2	10.7	8.1	0.48	0.58	8.11	16,103	62.5	350

Table 2.4 contains the matrix of correlations between the variables. Regarding dependent variables, we first observe that risk variables of *Earnings Volatility* and *Z-Score* have a negative correlation of 9%. Although a negative correlation between these variables was expected, its value is not as high as one could expect, which highlights the difference in approaches of measuring bank risk through earnings volatility or distance to default (*Z-Score*). It is remarkable the important negative correlations of *Earnings Volatility* with both *Size* and *Leverage*. It suggests that lower risk is associated with larger banks, which seems reasonable. Table 2.4 also shows that higher levered banks are associated with lower risk, which in principle is unexpected. However, from a reverse causality perspective, it is reasonable that sound banks can afford more leveraged financial structure. On the other hand, leverage does not appear significantly correlated with bank performance. Also remarkable are the important negative correlations of *Earnings Volatility* with *Rule of Law*, *Financial Development* and *Log(GDP per capita)*, together with the positive correlations of these latter with performance measured by *Risk-Adjusted ROA*, suggesting that banks in more legally and economically developed countries experience lower risk and better performance. Concerning competition in the banking industry, negative correlations of *Earnings Volatility*, and positive correlations of *Risk-Adjusted ROA* with both *Bank Concentration* and *Log(Number of Banks)* in principle are ambiguous. However, these proxies for competition reveal a very small and positive correlation of 3%, indicating that a regression analysis is necessary to clearly identify the relationship between these variables. Finally, *Shareholders Rights* correlates negatively with *Earnings Volatility* but has no correlation with performance.

Table 2.4 – Correlation Matrix (Panel with 4,681 observations of 795 banks located in 47 countries, in the 1997-2007 period)

	Earn. Volat.	Z-Score	Risk-Adj. ROA	Own. Conc.	Reven. Growth	Size	Lever.	Shar. Rights	Capital	Official	Private Monit.	Rule of Law	Fin. Devel.	GDP per capita	Bank Conc.	Log Number Banks	GDP Growth
Earnings Volatility	1																
Z-Score	-0.09*	1															
Risk-Adjusted ROA	-0.22*	0.22*	1														
Own. Concentration	0.13*	0.03*	-0.02	1													
Revenue Growth	0.03	-0.04*	0.04*	0.05*	1												
Size	-0.24*	-0.03	0.01	-0.31*	0.02	1											
Leverage	-0.23*	-0.03*	-0.01	-0.2*	0.01	0.53*	1										
Shareholder Rights	-0.07*	-0.07*	0.00	-0.17*	0.01	0.23*	0.14*	1									
Capital	-0.02	0.02	0.05*	0.07*	-0.03	-0.11*	-0.04*	-0.13*	1								
Official	0.12*	-0.07*	0.02	-0.07*	0.02	-0.03	-0.12*	0.00	0.07*	1							
Private Monitoring	0.03*	-0.03	-0.08*	-0.21*	-0.03	0.18*	0.03*	0.31*	0.09*	0.25*	1						
Rule of Law	-0.28*	0.13*	0.11*	-0.01	-0.06*	0.16*	0.06*	-0.16*	-0.01	-0.31*	-0.13*	1					
Financial Develop.	-0.23*	0.11*	0.06*	-0.01	-0.05*	0.12*	-0.02	-0.13*	0.00	-0.09*	-0.02	0.8*	1				
Log GDP per capita	-0.19*	0.11*	0.05*	0.01	-0.05*	0.19*	-0.01	-0.21*	-0.06*	-0.24*	-0.01	0.89*	0.73*	1			
Bank Concentration	-0.07*	0.08*	0.14*	0.16*	0.02	-0.15*	-0.15*	-0.28*	0.08*	-0.08*	-0.15*	0.42*	0.44*	0.34*	1		
Log Number Banks	-0.09*	0.12*	0.08*	0.16*	-0.05*	-0.11*	-0.07*	-0.3*	0.11*	-0.16*	-0.24*	0.53*	0.45*	0.51*	0.03*	1	
GDP Growth	0.04*	-0.04*	0.07*	0.01	0.14*	0.01	0.03*	0.18*	0.02	0.08*	-0.02	-0.32*	-0.35*	-0.32*	-0.1*	-0.27*	1
Country-Av. ROA	-0.02	0.01	0.12*	0.09*	0.1*	-0.04*	-0.07*	0.02	-0.08*	0.11*	-0.09*	0.00	-0.02	0.00	0.11*	0.11*	0.26*

* Significant at the 5% level.

2.4 Methodology

The methodology chosen to derive the results in this chapter is based on panel data analysis. More specifically, we perform dynamic panel estimations using the so-called system Generalized Method of Moments (GMM), a combination of the estimation techniques proposed by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998).

Our choice is first justified by the nature of the database available, which consists of observations of bank accounting and ownership variables distributed throughout a period of 14 years (from 1994 to 2007). As described in the previous section, an unbalanced panel composed of 4,681 bank-year observations, comprising 795 banks, along 11 years (from 1997 to 2007) was obtained after generating variables for bank risk and performance, and eliminating multivariate outliers.

A key variable on the analyses performed is the *Ownership Concentration*, defined as the sum of the direct and indirect fractions of bank's voting rights held by its largest shareholder. A concern would arise in using panel data techniques, if this variable were stable over time. However, for the panel used, there is variability in the *Ownership Concentration* variable for almost 80% of the banks. Yet we excluded from our sample the banks for which *Ownership Concentration* has no variability.

The main justification for the use of panel data analyses is that this technique is able to mitigate the influence of spurious characteristics in the relation between managers and shareholders. Similarly to Coles *et al.* (2006, 2007), we assume that risk, performance and ownership structure are jointly determined. It means that applying OLS techniques to our data would produce biased coefficients, provided that regressors are endogenous to the dependent variables. Following Roodman (2006), additional

features of our data have driven our choice to system GMM, instead of traditional random or fixed effects panel data estimation. First, our dependent variables (risk and performance) are dynamic, in the sense that they depend on past realizations. This is intuitively true, as risk and performance are likely to experience time clustering. Also, our risk and performance measures depend on their past value by construction, as they consist or include a standard deviation calculated in a moving window of four periods. The problem is that, unlike GMM estimation, OLS or the so-called Within Groups estimator of a fixed effects panel estimation cannot eliminate the dynamic panel bias that arises when pre-determined variables are included as regressors. Second, other bank specific variables are suspected to be endogenous or not strictly exogenous, such as *Leverage*, *Size* and *Revenue Growth*. Third, the panel used has few time periods and a large number of observations. Fourth, our specification is overidentified, as there are more instruments than parameters, which generates a system of moment conditions with more equations than variables, a condition to use GMM estimation. Fifth, system GMM estimation allows for the inclusion of time-invariant regressors, without (asymptotically) affecting the coefficients estimates for other regressors. Such a feature is suitable for our database, as variables for bank regulations and investor protection laws experience low variation over time. Finally, heteroskedasticity and autocorrelation within banks, but not across them, are assumed.

All panel regressions performed in this study use system GMM, which means that a system of two equations is used for each model – the original equation and a transformed one. Pre-determined and not strictly exogenous transformed variables of the transformed equation are instrumented with their available lags in levels, whereas the variables in levels of the original equation are instrumented with suitable lags of their own first differences. The use of system GMM is argued to dramatically improve

efficiency, respect to the so-called difference GMM, which consists only of the transformed equation. In this study, the transformation used in the second equation is the forward orthogonal deviations, which preserves the sample size of our unbalanced panel. We adopt the two-step estimation procedure with the finite-sample correction of standard errors proposed by Windmeijer (2005), which produces less biased coefficients and lower standard errors. To avoid problems of low precision of estimated coefficients when the number of periods is small we excluded from our sample banks with less than 3 years of observations (Arellano and Bond, 1991).

For all regressions, one lag of the dependent variable was included as a regressor (pre-determined variable). The choice of the two different sets of instruments respective to their equations, adopted the following procedure. Lags of pre-determined variables and *Ownership Concentration* were always considered as instruments to the transformed equation (i.e., they are in the so-called GMM instruments set). In general, *Revenue Growth*, *Leverage* and *Size*, which are bank specific variables suspected to be not strictly exogenous, are also included as GMM instruments. The remaining variables are considered strictly exogenous and are instrumented by the so-called IV-styled instruments. This set of instruments includes the transformed and the level of each strictly exogenous variable.

Regressions were run using the "xtabond2" program implemented by Roodman (2006). All regressions specifications are overidentified according to the Hansen test of overidentification restrictions (Hansen, 1982). Also, all the GMM and IV-styled instruments sets chosen are valid, as confirmed by the "difference in Hansen" test performed for each set of each regression (Hansen, 1982). Finally, the Arellano-Bond test for autocorrelation in the idiosyncratic disturbance term (aside from the fixed effect) is reported for each regression.

2.5 Results

This section presents and comments the results of our separate analyses of bank risk and performance and their relationships with ownership concentration, shareholders protections laws and banking regulations.

2.5.1 Bank risk taking

2.5.1.1 The role of ownership concentration

In order to test Hypothesis 1, in Table 2.5 we examine the relationship between ownership concentration and risk controlling by legal, bank regulations, and other bank and country specific variables. Column 1 shows the results of running a regression of *Earnings Volatility* on *Ownership Concentration* which includes only some bank and country specific explanatory variables. The results found do not provide evidence of ownership concentration linearly affecting bank risk. As shown in regression *R2*, the inclusion of *Leverage* and *State Owned* variables does not change this result. Finally, regression *R3*, which includes also bank regulations and shareholders rights variables, does not report a role for ownership concentration in explaining risk. Then, we expanded our model by including quadratic and cubic terms of *Ownership Concentration* to test for possible non-linear relationships with risk. Results in columns *R4* and *R5* of Table 2.5 support a quadratic relationship between ownership concentration and risk. Specifically, the relationship is U-shaped, with minimum *Earnings Volatility* occurring at the main owner's participation of 25%, according to regression *R5*. Figure 2.1 shows the effect of *Ownership Concentration* on *Earnings Volatility*. The evidence favours the risk-shifting hypothesis, given that bank risk taking increases as *Ownership Concentration* grows from values of 25% and above, suggesting

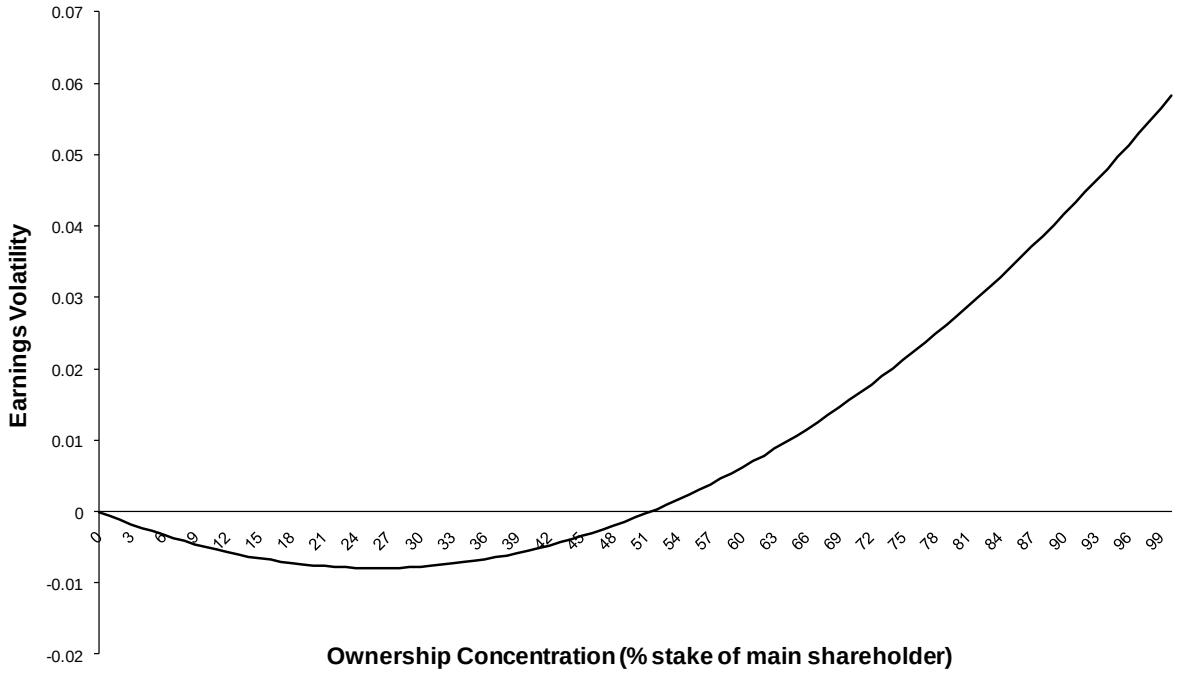
that largest shareholder experience increasing incentives to control or effectively monitor bank's managers according to her interests. On the other hand, bank risk is lower for values of *Ownership Concentration* below 50%, which favours the argument that private interests of managers prevail when ownership is dispersed. Also, it supports Burkart *et al.*, (1997)'s argument of less risk taking due to loss of managerial discretion under intense monitoring. We conclude that these results confirm Hypothesis 1.

Table 2.5 – Relationship between Bank Risk Taking, Ownership Structure, Laws, and Banking Regulations.

Dependent variable: Earnings Volatility. GMM dynamic panel-data regressions over the period 1997-2007. (Two-step system GMM, orthogonal deviations transform, Windmeijer's std errors correction). Constant and year dummies omitted. All coefficients and standard errors (in parentheses) are multiplied by 100. Significance levels: *** 1%, ** 5%; * 10%

Independent variables		*(R1)*	*(R2)*	*(R3)*	*(R4)*	*(R5)*
	Bank Specific					
1	Earnings Volatility (t-1)	87.33 ***	87.67 ***	77.83 ***	64.33 ***	64.09 ***
		(15.77)	(15.39)	(18.00)	(17.80)	(16.94)
2	Ownership Concentration	0.00	0.00	0.00	-0.02 *	-0.06 **
		(0.00)	(0.00)	(0.00)	(0.01)	(0.03)
3	Ownership Concentration^2				0.0002 *	0.001 *
					(0.0001)	(0.001)
4	Ownership Concentration^3					0.00
						(0.00)
5	Revenue Growth	0.08	0.09	-0.02	-0.01 **	-0.01 **
		(0.19)	(0.20)	(0.09)	(0.00)	(0.00)
6	Size	-0.02	-0.02	-0.01	-0.03 *	-0.03
		(0.03)	(0.03)	(0.12)	(0.02)	(0.02)
7	Leverage		0.00	0.00	-0.01	-0.01
			(0.01)	(0.03)	(0.01)	(0.01)
8	State Owned		-0.05	-0.33	0.14	0.10
			(0.10)	(0.25)	(0.13)	(0.13)
	Country Bank Regulations					
9	Capital			-0.04 **	-0.02 **	-0.02 *
				(0.02)	(0.01)	(0.01)
10	Official			0.02	-0.01	-0.01
				(0.02)	(0.02)	(0.01)
11	Private Monitoring			0.04 *	0.02	0.03
				(0.03)	(0.02)	(0.02)
	Other Country Specific					
12	Shareholders Rights			-0.40	-0.17	-0.15
				(0.33)	(0.19)	(0.18)
13	Rule of Law	-0.09	-0.08	0.47	-0.18 *	-0.20 *
		(0.16)	(0.16)	(0.40)	(0.10)	(0.11)
14	Financial Development	0.26	0.26	0.09	0.00	-0.01
		(0.24)	(0.25)	(0.08)	(0.08)	(0.08)
15	Log (GDP)	0.19	0.18	0.14	-0.02	-0.03
		(0.19)	(0.20)	(0.10)	(0.04)	(0.03)
16	Log (GDP per capita)	0.01	0.02	-0.52	-0.01	-0.01
		(0.03)	(0.03)	(0.33)	(0.09)	(0.09)
17	GDP growth	-0.06	-0.07	-0.04 ***	-0.02 *	-0.02 *
		(0.06)	(0.06)	(0.01)	(0.01)	(0.01)
18	Bank Concentration	-0.04 ***	-0.04 ***	0.26	0.15	0.28
		(0.01)	(0.01)	(0.22)	(0.28)	(0.24)
19	Log (Number of Banks)	0.06	0.06	-0.04	0.02	0.03
		(0.19)	(0.20)	(0.07)	(0.04)	(0.04)
20	Country-Average ROA	0.00	0.00	-0.03 ***	-0.04 ***	-0.04 ***
		(0.02)	(0.03)	(0.01)	(0.01)	(0.01)
Number of obs.		4,323	4,323	4,323	4,323	4,323
Number of groups (banks)		752	752	752	752	752
Number of instruments		60	62	90	169	213
GMM-style instruments		1, L2(2), L.(5, 14, 16)	1, L2(2), L.(5, 14, 16)	1, L2(2), L.(5, 6, 7, 16)	1, L2(2, 3)	1, L2(2, 3, 4)
IV-style instruments		6-8, 13, 15-20, year dum.	6-8, 13, 15-20, year dum.	8-15, 17-20, year dummies	4-20, year dummies	5-20, year dummies
F (variables; groups - 1)		43.05***	36.42***	11.42***	17.91***	18.37***
Arell.-Bond test for AR(2) in 1st differences (z; Pr > z)		0.58 0.561	0.59 0.555	0.07 0.947	0.17 0.865	0.15 0.878

Figure 2.1 – U-Shaped Relationship between Bank Risk and Ownership Concentration



2.5.1.2 Sub-samples

We proceed our analysis of bank risk by performing regressions on sub-samples of our working panel. First we check if ownership concentration differently affects bank risk taking across country legal protection of shareholders. The first two columns of Table 2.6 present the results of regressions considering respectively banks in countries with high shareholders rights (anti-self dealing index greater than its median of 0.41), and low shareholders rights (index equal or lower than 0.41). Results show that *Ownership Concentration* increases *Earnings Volatility* when protection of shareholders is high. Such evidence does not support Hypothesis 2, which relies on the theoretical argument that effective legal protection of shareholders works as a substitute for the existence of a large shareholder that monitors management. Instead, these mechanisms seem to complement each other to increase bank risk taking. In fact, shareholders are in

a better position to monitor managers if they are legally protected from self dealing on the part of managers. Interestingly, both capital regulations and official supervisory power are able to contain bank risk when shareholders' legal protection is high.

The next four regressions assess the importance of ownership concentration to bank risk taking when considering subsets of large/small banks and publicly listed/unlisted banks. This is to recognize that the importance of a large shareholder that monitors managers and encourages bank risk taking depends on the presence of additional governance mechanisms to which often only large and publicly listed firms are subject. Third and fourth columns of Table 2.6 contain the results of regressions on large and small banks subsets, respectively. Sub-sample of large banks includes the ones which total assets are ranked below the median of the country total assets ranking distribution. Evidence for this subset is that ownership concentration does not help to explain bank risk, which conforms to Hypothesis 2, considering that probably other governance mechanisms work to shape risk taking behaviour of large banks. The sample of small banks is composed by banks which *Size* variable (logarithm of total assets) is lower than the median of this variable. Confirming Hypothesis 2, result in fourth column shows that ownership concentration helps to increase risk of small banks. Turning to the publicly listed/unlisted banks, the evidence points that ownership concentration is not important to explain risk in any of these sub-samples. This last result does not support Hypothesis 2.

Table 2.6 – Relationship between Bank Risk, Ownership Structure, Laws, and Bank Regulations (Sub-Samples)

Dependent variable: Earnings Volatility. GMM dynamic panel-data regressions over the period 1997-2007. (Two-step system GMM, orthogonal deviations transform, Windmeijer's standard errors correction): Constant and year dummies omitted. All coefficients and standard errors (in parentheses) are multiplied by 100. Significance levels: *** 1%, ** 5%, * 10%.

		Shareholder Rights		*Size*		*Public listing*	
	Independent variables	*High*	*Low*	*Large*	*Small*	*Listed*	*Unlisted*
	Bank Specific						
1	Earnings Volatility (t-1)	45.24 ***	73.01 ***	37.45 ***	73.55 ***	47.56 **	88.65 ***
		(14.17)	(12.30)	(9.00)	(8.00)	(19.43)	(4.87)
2	Ownership Concentration	0.01 **	0.01	0.01	0.02 **	0.00	0.01
		(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
3	Revenue Growth	0.01	-0.10 *	0.00	0.00	-0.01	-0.04
		(0.02)	(0.06)	(0.02)	(0.07)	(0.03)	(0.03)
4	Size	-0.26	0.07	-0.16	0.01	-0.24	-0.03
		(0.19)	(0.06)	(0.13)	(0.14)	(0.16)	(0.03)
5	Leverage	0.04 *	-0.01	0.02	-0.01	0.05	0.00
		(0.02)	(0.01)	(0.02)	(0.01)	(0.04)	(0.01)
6	State Owned	-0.12	0.07	0.11	0.09	0.37	0.09
		(0.18)	(0.21)	(0.25)	(0.16)	(0.27)	(0.26)
	Country Bank Regulations						
7	Capital	-0.05 *	-0.03	-0.05 **	-0.03	0.00	-0.03
		(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)
8	Official	-0.05 *	0.01	0.00	-0.04	-0.01	0.02
		(0.03)	(0.01)	(0.02)	(0.02)	(0.03)	(0.02)
9	Private Monitoring	0.09 *	-0.02	0.03	0.08 **	-0.05	0.03
		(0.05)	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)
	Other Country Specific						
10	Shareholders Rights	-0.67	-0.66	-0.11	-0.46 *	0.34	-0.27
		(0.45)	(0.52)	(0.24)	(0.26)	(0.32)	(0.38)
11	Rule of Law	-0.48 **	-0.09	-0.35 ***	-0.19	-0.50 **	0.12
		(0.19)	(0.12)	(0.10)	(0.13)	(0.22)	(0.16)
12	Financial Development	0.18	0.11	-0.01	0.19	-0.06	0.40
		(0.18)	(0.30)	(0.10)	(0.17)	(0.13)	(0.42)
13	Log (GDP)	0.13	0.09	0.09	-0.04	0.04	0.11
		(0.18)	(0.06)	(0.13)	(0.05)	(0.10)	(0.13)
14	Log (GDP per capita)	0.13	-0.12	0.15 *	-0.07	0.30 *	-0.28
		(0.10)	(0.14)	(0.08)	(0.07)	(0.17)	(0.22)
15	GDP growth	0.00	-0.04 **	-0.02 ***	-0.06 ***	-0.03 **	-0.02
		(0.02)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)
16	Bank Concentration	0.42	0.19	0.01	-0.11	0.12	-0.31
		(0.42)	(0.33)	(0.22)	(0.36)	(0.31)	(0.44)
17	Log (Number of Banks)	-0.05	-0.06	-0.02	0.03	0.00	-0.04
		(0.18)	(0.05)	(0.05)	(0.05)	(0.09)	(0.08)
18	Country-Average ROA	-0.15 ***	-0.01	-0.03 **	-0.03 **	0.01	-0.09 **
		(0.04)	(0.02)	(0.02)	(0.02)	(0.01)	(0.04)
Number of obs.		2,139	2,184	2,192	2,118	1,679	2,644
Number of groups (banks)		377	375	366	431	324	497
Number of instruments		359	358	359	359	321	125
GMM-style instruments		1, L2(2), L.(3, 4, 5)	1, L2(2), L.(3, 4, 5)	1, L2(2), L.(3, 4, 5)	1, L2(2), L.(3, 4, 5)	1, L2(2), L.(3, 4, 5)	1, L2(2)
IV-style instruments		6-18, time dummies	6-18, time dummies	6-18, time dummies	6-18, time dummies	6-18, time dummies	3-18, time dummies
F (variables; groups - 1)		14.75***	43.34***	11.75***	50.72***	12.77***	29.21***
Arell.-Bond test for AR(2) in 1st differences (z; Pr > z)		-0.24 0.813	0.93 0.354	0.16 0.870	0.85 0.398	-0.91 0.362	0.75 0.456

2.5.1.3 The role of laws

Regressions in Table 2.5 do not report a role for shareholders rights in explaining bank risk. However, when analyzing sub-samples regressions of Table 2.6, we first find that increasing shareholders rights reduces the risk of small banks. Considering that in average ownership is more concentrated in the subset of small banks (mean largest shareholder's stake of 67% versus 50% in large banks), this result may suggest that legal protection of shareholders is able to contain excessive risk taking by managers or controlling shareholders of small banks. Recall that for very high levels of ownership concentration the relationship between it and risk is increasing. However, this interpretation must be taken with caution, as the anti self-dealing index of Djankov *et al*. (2008) focus on publicly traded firms, while in our sample only 20% of small banks are listed.

Concerning the degree of enforcement of laws, it is remarkable that *Rule of Law* reduces the risk of banks in the sub-samples of high legal protection of shareholders, large banks, as well as publicly listed banks, according to Table 2.6. The evidence supports a role for the effectiveness of legal systems in containing bank risk, that is complementary to shareholders protection laws and other governance mechanisms to which large and publicly listed banks are subjected.

2.5.1.4 The role of bank regulations

From regressions *R3* to *R5* in Table 2.5, we notice that capital regulatory restrictions reduce bank risk. Even though the *Capital* variable does not represent a perfect adherence to Basel II's first pillar, we believe the evidence supports Basel II's policy recommendation on the stringency of capital requirements to reduce bank risk taking and strengthen financial stability. Evidence from Table 2.6 tells that capital

regulations stringency reduces the risk of banks in countries with high legal protection of shareholders, and of large banks. As previously mentioned, it suggests that capital regulations complement shareholders' legal protection in reducing bank risk taking. In addition, it seems that capital regulations are more effective in reducing the risk of large banks. Regarding official supervisory power, there is evidence that it also behaves as a complement to shareholders protection laws in reducing bank risk. Regression *R3* in Table 2.5 shows that the level of external private monitoring on banks has a positive effect on their *Earnings Volatility*. According to Table 2.6, this is especially true if shareholders' protection laws are high and banks are small, even though the significance of coefficients is not high. The evidence suggests that regulations promoting transparency and market discipline of banks induce them to take more risk. Such result does not support the role of private monitoring as a reinforcing mechanism to capital regulations and official supervisory power in reducing risk. Despite the evidence is not desirable from the perspective of regulatory authorities, the effectiveness of private monitoring to induce not only bank risk, but also performance is assessed in Section 2.5.2.2.

2.5.1.5 Z-Score analysis

Regressions are also run on *Z-Score* as a dependent variable. For the complete sample, column *R1* of Table 2.7 shows no evidence that ownership concentration influences *Z-Score*. We then decided to include *Leverage* as a regressor, as by construction, *Z-Score* is correlated with *Leverage*. Doing so, ownership concentration still does not have any impact on *Z-Scor*e, as shown in column *R2*, even though *Leverage* appears negatively influencing *Z-Score*. After, we search for a similar evidence of Laeven and Levine (2006), who find a negative relationship between main

owner's cash flow rights (which is supposed to be highly correlated with ownership concentration) and *Z-Score*, in a sample composed by large banks. For such, we restricted the sample to the largest banks in each country (banks ranked bellow the median of country's ranking of bank total assets). Confirming Laeven and Levine (2006), regression *R3* of Table 2.6 shows a negative and significant coefficient for ownership concentration. However, including *Leverage* renders *Ownership Concentration* not significant (regression *R4*). Such finding may suggest that the results of Laeven and Levine (2006) should be interpreted taking into account that they do not consider leverage as an explanatory factor of bank stability through Z-Score.

All regressions in Table 2.7 show a significant positive impact of *Rule of Law* on *Z-Score*. Together with the previously mentioned evidence of a decreasing impact of *Rule of Law* on *Earnings Volatility*, we conclude that, from a prudential point of view, *Rule of Law* has a beneficial role in terms of promoting bank soundness.

Table 2.7 – Relationship between Z-Score, Own. Concentration, Laws, and Regulations.

Dependent variable: Z-Score. GMM dynamic panel-data regressions over the period 1997-2007. (Two-step system GMM, orthogonal deviations transform, Windmeijer's standard errors correction): (R1): All the sample; (R2): All the sample, including Leverage; (R3): Large Banks; (R4) Large Banks, including Leverage. Constant and year dummies omitted. Standard errors in parentheses. Significance levels: *** 1%, ** 5%; * 10%.

	Independent variables	*(R1)*	*(R2)*	*(R3)*	*(R4)*
	Bank Specific				
1	Z-Score (t-1)	0.29 **	0.29 **	0.55 ***	0.57 ***
		(0.13)	(0.13)	(0.04)	(0.06)
2	Ownership Concentration	0.02	0.03	-0.13 *	-0.08
		(0.25)	(0.25)	(0.08)	(0.07)
3	Revenue Growth	-2.80	-2.05	0.30	-0.41
		(7.21)	(7.10)	(0.47)	(0.80)
4	Size	-0.63	0.53	-1.10 **	-0.42
		(1.36)	(1.34)	(0.49)	(0.67)
5	Leverage		-0.49 ***		-0.29
			(0.15)		(0.27)
6	State Owned	4.21	3.21		
		(7.72)	(7.68)		
	Country Bank Regulations				
7	Capital	0.11	0.14	0.45	0.40
		(0.59)	(0.59)	(0.31)	(0.31)
8	Official	-0.55	-0.67	-0.24	-0.29
		(0.57)	(0.59)	(0.35)	(0.38)
9	Private Monitoring	0.62	0.58	-0.45	-0.17
		(1.08)	(1.08)	(0.68)	(0.85)
	Other Country Specific				
10	Shareholders Rights	-2.73	-3.32	-2.19	-4.81
		(5.84)	(5.83)	(3.99)	(4.11)
11	Rule of Law	6.70 **	8.06 ***	4.90 ***	5.91 ***
		(2.83)	(2.89)	(1.44)	(1.56)
12	Financial Development	1.06	0.83		
		(4.75)	(4.84)		
13	Log (GDP)	-0.71	-0.65		
		(1.91)	(1.92)		
14	Log (GDP per capita)	-1.12	-2.27	-1.01	-1.40
		(2.19)	(2.22)	(0.92)	(1.05)
15	GDP growth	-0.08	-0.11		
		(0.44)	(0.43)		
16	Bank Concentration	6.81	5.45		
		(7.84)	(7.73)		
17	Log (Number of Banks)	2.14	2.13		
		(1.73)	(1.72)		
18	Country-Average ROA	0.21	0.08	0.22	0.27
		(0.51)	(0.51)	(0.16)	(0.22)
Number of obs.		4,681	4,681	2,314	2,314
Number of groups (banks)		795	795	382	382
Number of instruments		56	57	180	262
GMM-style instruments		1, L2(2), L(3, 4)	1, L2(2), L(3, 4)	L(1, 3), L2(2)	L(1, 3, 5), L2(2)
IV-style instruments		6-18, year dummies	5-18, year dummies	4, 7-11, 14, 18, year dum.	4, 7-11, 14, 18, year dum.
F (variables; groups - 1)		6.32***	6.83***	25.67***	23.85***
Arellano-Bond test for AR(2) in 1st differences (z; Pr > z)		0.51 0.613	0.50 0.615	1.65 0.101	1.64 0.102

2.5.2 Bank Performance

2.5.2.1 The role of ownership concentration

In this section, we analyze the effect of ownership concentration on performance in order to contrast Hypotheses 3 and 4. Such analysis will also help us clarifying whether riskier taking decisions are always aimed at improving firm value. Instead, they may be the result of misbehaviour or inefficiencies resulting from the conflicts of interests between shareholders and managers, such as asset substitution, expropriation and entrenchment. In the case of banks, these problems might be worse due to higher opacity and leverage. Therefore, we extend our analysis by looking at how bank performance is affected by ownership concentration and other governance mechanisms.

Table 2.8 shows the results of contrasting Hypothesis 3. The evidence found conforms to the previous hypothesis and supports a cubic relationship between ownership concentration and bank performance. Significance of linear, quadratic and cubic coefficients is attained at least at the 5% level considering different sets of regressors. For the estimation including all regressors (column *R4* of Table 2.8), the correspondent equation relating bank performance to ownership concentration support a positive effect of ownership concentration on performance, when the largest shareholder's stake increases until around 30%. This effect occurs probably due to effective monitoring by the main shareholder (e. g., Burkart *et al.*, 1997). For values of ownership concentration from around 30% to around 85%, bank performance decreases, supporting the hypotheses of expropriation of minority shareholders by the main shareholder (Shleifer and Vishny, 1986; Faccio and Stolin, 2004), or alternatively, of increasing costs of managerial loss of discretion (Burkart *et al.*, 1997). From values of ownership concentration from 85% to 100%, bank performance increases, giving support to the prediction that expropriation is reduced as a consequence of its increasing

costs imposed to the main shareholder (Burkart *et al*., 1998). Figure 2.2 illustrates the cubic shape obtained for the relationship between performance and ownership concentration.

2.5.2.2 Interactions

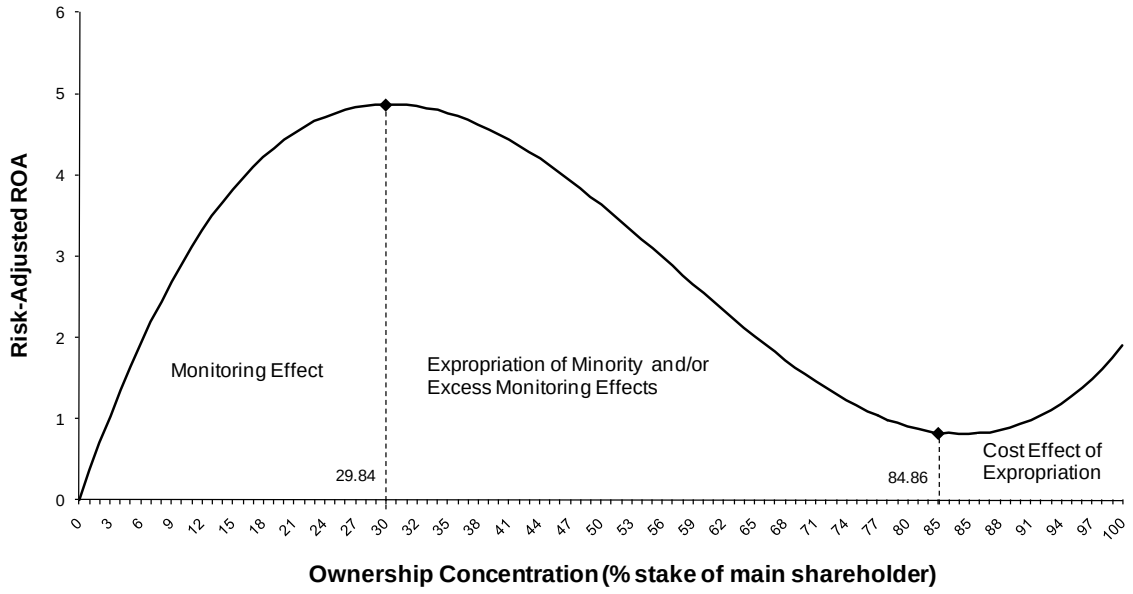
It is argued in section 2 that the importance of agency problems is likely to differ contingent on firms' ownership concentration structures. On the one hand, conflicts of interests between shareholders and managers are more important in dispersed ownership structures, respect to concentrated ownership structures. This is so because in the latter shareholders' interests are likely to prevail. On the other hand, conflicts between controlling and minority shareholders are likely to be worse in firms with concentrated ownership structures. Therefore, in order to help deriving conclusions regarding the role of shareholders protection laws, bank regulations and competition on performance, we run regressions including the interaction of ownership concentration with variables for shareholders rights, bank regulations, and competition on two separate sub-samples of banks. The first sub-sample includes banks with dispersed ownership structures (main owner with an equity stake up to 50%), while the second includes banks with concentrated ownership structures (main owner's stake greater than 50%).

Table 2.8 – Cubic Relationship between Bank Performance and Ownership Concentration, controlled for Laws, Banking Regulations, and Bank specific factors

Dependent variable: Risk-Adjusted ROA (Return over Average Assets). GMM dynamic panel-data regressions over the period 1997-2007 (Two-step system GMM, orthogonal deviations transform, Windmeijer's standard errors correction). Constant and year dummies omitted. All coefficients and standard errors (in parentheses) are multiplied by 100. Significance levels: *** 1%, ** 5%; * 10%.

	Independent variables	*(R1)*	*(R2)*	*(R3)*	*(R4)*
	Bank Specific				
1	Risk-Adjusted ROA (t-1)	33.73 ***	31.40 ***	33.87 ***	31.40 ***
		(9.51)	(8.81)	(9.23)	(8.95)
2	Own. Concentration	38.87 ***	35.64 **	39.60 ***	36.92 **
		(11.47)	(16.67)	(13.80)	(17.30)
3	Own. Concentration ^2	-0.87 ***	-0.83 **	-0.90 ***	-0.84 **
		(0.27)	(0.38)	(0.33)	(0.39)
4	Own. Concentration ^3	0.005 ***	0.005 **	0.005 ***	0.005 **
		(0.002)	(0.002)	(0.002)	(0.002)
5	Revenue Growth	0.94 ***	0.15	2.93	-0.02
		(0.33)	(5.39)	(4.36)	(5.40)
6	Size	43.30	58.06 *	52.79 *	56.17 *
		(29.16)	(30.41)	(30.66)	(31.02)
7	Leverage	-7.10	-8.07 **	-7.40	-8.13 **
		(5.02)	(3.74)	(4.70)	(3.62)
8	State Owned	-41.60	-63.86	-66.05	-66.51
		(45.89)	(44.91)	(45.95)	(47.44)
	Country Bank Regulations				
9	Capital			14.66 ***	10.32 **
				(4.72)	(4.12)
10	Official			2.31	4.39
				(3.77)	(5.06)
11	Private Monitoring			-32.59 ***	-17.01 **
				(12.58)	(8.22)
	Other Country Specific				
12	Shareholders Rights				56.04
					(67.13)
13	Rule of Law		94.56 ***		88.69 ***
			(25.18)		(25.60)
14	Financial Development		-94.92 ***		-91.43 ***
			(32.46)		(31.25)
15	Log (GDP)		-63.18 ***		-53.90 ***
			(20.06)		(20.83)
16	Log (GDP per capita)		-24.04		-14.82
			(18.43)		(17.46)
17	GDP growth		2.06		1.80
			(2.67)		(2.63)
18	Bank Concentration		-29.00		-48.74
			(76.69)		(75.19)
19	Log (Number of Banks)		60.41 **		50.16 **
			(24.51)		(23.45)
20	Country-Average ROA		6.42 *		6.30 *
			(3.35)		(3.30)
Number of obs.		4,681			
Number of groups (banks)		795			
Number of instruments		363	443	438	447
GMM-style instruments		1, L2(2, 3, 4), L(6, 7)	1, L2(2, 3, 4), L(5, 6, 7)	1, L2(2, 3, 4), L(5, 6, 7)	1, L2(2, 3, 4), L(5, 6, 7)
IV-style instruments		5, year dummies	8, 13-20, year dummies	8-11, year dummies	8-20, year dummies
F (variables; groups - 1)		14.96 ***	14.85 ***	14.82 ***	13.07 ***
Arellano-Bond test for AR(2) in 1st differences (z; Pr > z)		0.97 0.332	0.97 0.333	0.95 0.343	0.97 0.332

Figure 2.2 – Cubic Relationship between Bank Performance and Ownership Concentration



For the whole sample, we did not find evidence that the level of protection of shareholders influence bank performance (regression *R4* of Table 2.8). However, there is evidence that shareholders rights and its interaction with ownership concentration matter for performance of banks with dispersed ownership structure. Coefficients for ownership concentration and shareholders rights enter positively and significant when explaining performance, whereas the coefficient for the interaction term is negative and significant (first regression of Table 2.9). These results tell, first, that an increase in ownership concentration improves performance of banks with dispersed ownership, supporting again the effectiveness of monitoring in aligning shareholders' and managers' interests. Second, increasing the protection of shareholders also improves performance. And third, the negative interaction term tells us that the positive effect of ownership concentration on performance is more important when shareholders rights

are low. Alternatively, increasing ownership concentration is less important to performance of banks in countries with strong legal protection of shareholders. Such evidence is very similar to the one of Caprio *et al*. (2007), except that they consider large banks with any ownership structure (not only dispersed ownership), and firm value instead of performance. The magnitude of the coefficients are such that at levels of ownership concentration below 26%, it is necessary a level of shareholders rights above its median to keep an increasing relationship between the net effect of these variables and performance. On the other hand, for levels of ownership concentration above 26%, the net effect of shareholders rights and ownership concentration on performance is increasing only if shareholders rights variable is below its median. This result suggests substitutive roles of ownership concentration and shareholders rights to increase bank performance, which does not support Hypothesis 4. We did not find any evidence for the role of shareholders rights in banks with concentrated ownership structures (regressions are not reported).

Table 2.9 – Banks with Dispersed Ownership Structures: The Effect of Shareholders Protection Laws, Capital Regulations and Competition on Bank Performance

Dependent variable: Risk-Adjusted ROA (Return over Average Assets). GMM dynamic panel-data regressions over the period 1997-2007. (Two-step system GMM, orthogonal deviations transform, Windmeijer's standard errors correction). Constant and year dummies omitted. All coefficients and standard errors (in parentheses) are multiplied by 100. Significance levels: *** 1%, ** 5%; * 10%.

	Independent variables	*Shareholders Rights*	*Capital*	*Log (Number Banks)*
1	Risk-Adjusted ROA (t-1)	47.85 ***	50.55 ***	48.50 ***
		(4.26)	(4.03)	(4.45)
	Interaction			
2	Ownership Concentration	19.05 **	-8.72 ***	-6.61 *
		(7.77)	(3.22)	(4.05)
3	Shareholders Rights	1,033 **	97.88	-19.14
		(437.16)	(67.81)	(94.18)
4	Capital	1.99	-25.87 *	6.85
		(5.50)	(14.95)	(5.54)
5	Log (Number of Banks)	52.33 *	59.28 ***	37.27
		(28.89)	(17.51)	(37.96)
6	Own. Concentration * Shareholders Rights	-39.39 **		
		(16.68)		
7	Own. Concentration * Capital		1.26 ***	
			(0.47)	
8	Own. Concentration * Log (Number of Banks)			1.46 *
				(0.79)
	Other Bank and Country Specific			
9	Revenue Growth	-19.44	29.73	-11.53
		(41.08)	(22.47)	(40.41)
10	Size	35.90	19.70	59.00 *
		(33.92)	(19.25)	(35.39)
11	Leverage	-0.16	3.22	-0.61
		(4.31)	(3.36)	(5.32)
12	State Owned	-71.85	29.09	-74.76
		(86.88)	(70.14)	(90.70)
13	Official	-4.47	3.20	-2.73
		(6.09)	(5.09)	(6.36)
14	Private Monitoring	-10.24	-9.28	6.24
		(11.47)	(9.06)	(10.66)
15	Rule of Law	-13.22	20.81	9.13
		(44.16)	(33.51)	(40.14)
16	Financial Development	-57.73	-82.33 ***	-108.05 ***
		(39.57)	(29.18)	(40.69)
17	Log (GDP)	-80.12 ***	-61.50 ***	-95.47 ***
		(27.06)	(18.99)	(28.02)
18	Log (GDP per capita)	32.74	16.67	25.10
		(22.89)	(22.46)	(21.77)
19	GDP growth	3.55	2.90	2.83
		(2.41)	(2.10)	(2.49)
20	Bank Concentration	-83.12	94.40	-86.54
		(82.59)	(75.47)	(89.58)
21	Country-Average ROA	15.12 ***	8.58 **	8.46 *
		(4.48)	(3.62)	(4.40)
Number of obs.		1,844	1,844	1,844
Number of groups (banks)		353	353	353
Number of instruments		81	340	82
GMM-style instruments		L2.(1), 4 L(5, 6, 7)	L2(1), 9, L(10, 11, 12)	L2(1), 9, L(10, 11, 12)
IV-style instruments		2, 3, 8-19, year dummies	2, 4-8, 12-20, year dummies	2, 4-8, 12-20, year dummies
F (variables; groups - 1)		14.74***	19.64***	14.19***
Arell.-Bond test for AR(2) in 1st differences (z; Pr > z)		1.28 0.201	1.27 0.203	1.26 0.209

Regressions *R3* and *R4* in Table 2.8 report a role for some bank regulations in explaining bank performance. First, the stringency of capital regulations has a positive impact on *Risk-Adjusted ROA*. Such evidence supports a beneficial role of capital regulations in attaining bank efficiency. Recall that we previously found that capital regulations stringency reduces bank risk (see Section 2.5.1.4). Considering that Basel II's policy recommendations focus on limiting bank risk taking to promote financial stability, our results go beyond and offer a strong argument to strengthen capital regulations: to improve bank efficiency, in addition to attain financial stability. In other words, capital regulations stringency is beneficial either from the systemic viewpoint of the regulator, as from the individual bank's viewpoint of performance improving. Again, we clarify that capital regulations stringency in this study is represented by the index proposed by Barth *et al*. (2006), which does not represent a perfect adherence to Basel II's first pillar. Table 2.9 provides additional evidence on the influence of capital regulations stringency on the performance of banks with dispersed ownership structures (largest shareholder's stake lower than or equal to 50%). The interaction of *Capital* with *Ownership Concentration* is positive when influencing *Risk-Adjusted ROA*. It means that increasing both capital regulations stringency and ownership concentration helps to increase performance. For the selected sub-sample, ownership concentration linearly decreases performance, even though from Figure 2.2 we observe that there are ranges of increasing and decreasing performance with respect to ownership concentration. The positive interaction term tells that the decreasing effect of ownership concentration on performance is less important if capital regulations are more stringent. Irrespective of the relationship between ownership concentration and performance for levels of ownership concentration below 50%, we conclude that capital regulations and

ownership concentration complement each other to increase the performance of banks, which provides support to Hypothesis 4.

Second evidence is the negative influence of *Private Monitoring* on bank performance, according to regressions *R3* and *R4* in Table 2.8. Together with the previous evidence of the positive influence of private monitoring on bank risk (see Section 2.5.1.4), we conclude for a detrimental role of private monitoring from the perspectives of both the regulatory authorities and the banks. It may be the case that the excess of transparency hinders competitive advantages of banks in seeking investments opportunities, in the sense that a certain level of information opaqueness is necessary for banks to provide added-value services (Bruni and Paterno, 1995).

Finally, bank competition measured by the number of banks in a country has a positive impact on bank performance, according to regressions *R2* and *R4* in Table 2.8. Furthermore, last column of Table 2.9 shows that *Log(Number of Banks)* interacts positively with *Ownership Concentration* to increase the performance of banks with dispersed ownership structure. It means that the decreasing effect of ownership concentration in bank performance is less important if the bank industry is more competitive. Again, even though performance is initially increasing and then decreasing with respect to levels of ownership concentration below 50% (see Figure 2.2), the complementary relation given by the positive interaction between competition and ownership concentration supports Hypothesis 4.

2.5.2.3 Robustness check for cubic relationship

The inclusion of quadratic and cubic terms of the *Ownership Concentration* variable in regressions of Table 2.8 may be a concern if multicollinearity between these variables is high enough to invalidate the cubic relationship obtained. Therefore, in

order to check the robustness of the cubic relationship between ownership concentration and bank performance obtained in regression *R4* of Table 2.8, we perform piece-wise regressions to assess the linear relationship between these variables in each of the three different ranges of ownership concentration characterized in Figure 2.2. In the first range, where *Ownership Concentration* is between 0 and 30%, *Risk-Adjusted ROA* increases with *Ownership Concentration.* The second range has *Ownership Concentration* varying between 30% and 85% and is characterized by a negative relationship between *Risk-Adjusted ROA* and *Ownership Concentration.* In the third range, that includes values of *Ownership Concentration* from 85% to 100%, the linear relationship between the variables is positive. Table 2.10 report the results of the three separate piece-wise linear regressions for checking the sign of the linear relationship between *Ownership Concentration* and *Risk-Adjusted ROA.* The signs of the coefficients of *Ownership Concentration* for each range coincide with the signs of the net effect of this variable on bank performance, in each range of the cubic relationship represented in Figure 2.2. Moreover, the coefficients are significant for second and third ranges. Therefore, results in Table 2.10 assure the robustness of the cubic relationship between ownership concentration and bank performance previously obtained.

Table 2.10 – Robustness Check for Cubic Relationship between Bank Performance and Ownership Concentration.

Dependent variable: Risk-Adjusted ROA (Return over Average Assets). GMM dynamic panel-data regressions over the period 1997-2007 (Two-step system GMM, orthogonal deviations transform, Windmeijer's standard errors correction). Constant and year dummies omitted. All coefficients and standard errors (in parentheses) are multiplied by 100. Significance levels: *** 1%, ** 5%; * 10%.

	Independent variables	*Own. Conc <=30*	*30<Own. Conc <85*	*Own. Conc >=85*
	Bank Specific			
1	Risk-Adjusted ROA (t-1)	48.73 ***	22.96 **	34.58 ***
		(4.75)	(9.95)	(6.45)
2	Own. Concentration	0.05	-3.62 **	2.78 *
		(1.15)	(1.84)	(1.91)
3	Revenue Growth	-13.16	7.57 *	9.53
		(74.45)	(4.15)	(11.46)
4	Size	7.12	56.54	23.43 ***
		(8.10)	(45.07)	(7.23)
5	Leverage	-2.45	-6.52	-2.12 **
		(2.06)	(7.24)	(1.05)
6	State Owned	48.73 ***	-86.92	-8.15
		(4.75)	(89.72)	(30.72)
	Country Bank Regulations			
7	Capital	148.88	4.46	7.20
		(132.66)	(7.01)	(5.52)
8	Official	14.55 **	-4.41	11.36 **
		(7.02)	(11.10)	(5.01)
9	Private Monitoring	3.72	-15.68	-3.44
		(6.20)	(13.41)	(10.55)
	Other Country Specific			
10	Shareholders Rights	73.43	-39.30	107.69
		(78.77)	(125.21)	(78.06)
11	Rule of Law	40.78	100.33 *	75.00 **
		(46.65)	(52.44)	(31.24)
12	Financial Development	-75.96 ***	-61.20	-10.76
		(28.27)	(72.44)	(50.94)
13	Log (GDP)	-31.71	-84.24 **	-19.25
		(23.18)	(33.67)	(18.54)
14	Log (GDP per capita)	11.54	-37.29	-13.22
		(29.87)	(35.87)	(18.31)
15	GDP growth	4.54	1.03	3.57
		(4.05)	(4.13)	(3.62)
16	Bank Concentration	-1.38	18.62	-121.19
		(130.24)	(86.55)	(80.05)
17	Log (Number of Banks)	16.16	80.47 **	14.46
		(15.83)	(37.58)	(14.63)
18	Country-Average ROA	21.35 **	1.67	6.43
		(9.94)	(4.47)	(4.20)
Number of obs.		1,167	1,540	1,553
Number of groups (banks)		231	305	301
Number of instruments		156	287	197
GMM-style instruments		1, L2(2), L(3)	1, L2(2), L(4, 5)	1, L2(2), L(3)
IV-style instruments		4-18, year dummies	3, 6-18, year dummies	4-18, year dummies
F (variables; groups - 1)		25.65***	7.13***	8.72***
Arellano-Bond test for AR(2) in 1st differences (z; Pr > z)		0.99 0.323	0.68 0.497	1.12 0.261

2.6. Conclusions

This chapter examines the relationships between banks' ownership concentration, risk and performance, controlling for legal protection of shareholders, bank regulations and other bank and country specific characteristics. We derive our results performing dynamic panel data estimations on a database composed of 4,681 bank-year observations, generated by 795 banks located in 47 countries in the period from 1997 to 2007. Our analysis departs from studying the effect of ownership concentration (measured by the equity stake of the bank's largest shareholder) on bank risk (measured by earnings volatility), and concludes that these variables have a non-linear U-shaped relationship. Bank risk increases at values of ownership concentration above 25%. This finding supports a role for ownership concentration as a mechanism of aligning the interests of managers to those of shareholders, who have intrinsic incentives to risk-shifting. Results also show that ownership concentration increases bank risk when legal protection of shareholders is high, suggesting that these mechanisms complement each other to increase bank risk taking, through effective monitoring of managers by shareholders if these are legally better protected from self dealing on the part of managers. In addition, evidence tells that the risk of small banks increases with ownership concentration. Contrasting with previous evidence of Laeven and Levine (2006), the result does not hold for large banks, which suggests that these are probably subjected to other governance mechanisms that shape their risk taking behaviour.

Regarding the relationship between bank ownership structure and performance (measured by the risk-adjusted return on assets), we borrow from Morck *et al.* (1988) to propose a cubic relationship between both variables. We explain this S-shape

relationship relying on the two main agency problems that appear within an organization, independently whether it is financial or non-financial. The first problem appears between managers and shareholders in the absence of appropriate incentives or sufficient monitoring to align manager's interest with that of shareholders (we can define it as agency problem one, APO). The second agency problem appears between controlling and minority shareholders, when expropriation by controlling shareholders at the expense of minority shareholders takes place (we can define it as agency problem two, APT). The role of corporate governance mechanisms, like ownership structure, is to mitigate both agency costs (Shleiffer and Vishny, 1997). In particular, when ownership structure is dispersed, the APO is particularly harmful. In this situation, an increase in ownership concentration reduces the free-riding in monitoring that appears in dispersed ownership structures. As a consequence, APO is alleviated, and performance should improve. This logic applies until the point where the ownership concentration is high enough such that shareholders with a significant stake (blockholders) emerge. These blockholders have power high enough to force the firm to follow practices that only favour blockholders' interests (APT). In this situation, the APT is more important than the APO and becomes particularly important as the ownership concentration increases. The result is a decrease in performance. Finally, when ownership concentration is quite large, the large stake of blockholders hinders their incentives to internalize a very significant proportion of the expropriation costs. This should lead to an improvement in performance. An alternative explanation for a decrease in performance for moderate levels of ownership concentration is the trade-off between the benefits of monitoring and those of managerial discretion, proposed by Burkart *et al.* (1997). In other words, as monitoring by shareholders increases, managers

have less discretion and initiative to seek new investment opportunities, which reflects in performance deterioration.

The results confirm our arguments and we find evidence of a cubic relationship between ownership concentration and bank performance. Our findings indicate that the expropriation (and/or loss of managerial discretion) region is between 30% and 85%. This is remarkable given that for a significant proportion of banks (around 40%), the total stake of the three largest shareholders falls in that region. Such evidence gives us a warning signal of the seriousness of the problem in financial institutions, particularly in countries with a weak corporate governance system. This kind of situation introduces inefficiencies in the functioning of banks that may have perverse effect on the overall financial system. To investigate these issues in a deeper level should be the subject of some future research.

Regarding the influence of country factors and its interactions with ownership concentration on bank performance, we first find that ownership concentration is more important to increase the performance of banks with dispersed ownership structures when the legal protection of minority shareholders is low, which is evidence similar to that obtained by Caprio *et al*. (2007).

Second, the stringency of capital regulations has a positive impact on bank performance, which supports a beneficial role of capital regulations in attaining bank efficiency. Together with the evidence that capital regulations stringency reduces bank risk, the results offer a strong argument for strengthening capital regulations, provided that it is beneficial either from the systemic perspective of regulatory authorities, who seek to attain financial stability, as from the individual bank's perspective of performance improving. Moreover, capital regulations stringency interacts positively

with ownership concentration to increase performance of banks with dispersed ownership structure.

Third, we report a negative influence of external private monitoring of banks on their performance. Together with the evidence of the positive influence of private monitoring on bank risk, we conclude for a detrimental role of private monitoring from the perspectives of both the regulatory authorities and the banks. It seems that the excess of transparency hinders banks' competitive advantages that otherwise would derive from a certain level of information opaqueness.

Lastly, bank competition measured by the number of banks in a country has a positive impact on bank performance. In addition, competition interacts positively with ownership concentration to increase the performance of banks with dispersed ownership structure.

A final comment is that our results help to shed a light on the issue of whether banks are different from non-financial firms. We obtained a non-linear (cubic) relationship between ownership concentration and bank performance that do not importantly diverge from the empirical evidence available for firms in general (see a survey by Miguel *et al.* 2004). Therefore, even presenting unique characteristics that make them differ from non-financial firms (e. g., higher leverage, greater opacity and heavy regulations), our evidence indicates that banks behave in the same way as firms in general, in response to the same agency problems and similar corporate governance mechanisms they are subjected, when compared with non-financial firms.

Chapter Three

Bank Regulations and Loan Contracts

3.1 Introduction

The existence of banks as financial intermediaries and the functioning of the banking system are argued to be of great importance in determining a country's economic growth and stability (Allen and Gale, 2000; Levine, 2006). More specifically, the credit channel plays a pivotal role in the transmission of the monetary policy, which is a basic element for achieving a sustained economic growth (e.g., Bernanke and Gertler, 1995), as well as financial stability. Governments and national institutions all over the world are aware of the important role played by financial institutions and impose several regulations on the banking sector. More formally, the need for regulation is grounded on two basic reasons: first, the risk of a systemic crisis that would spread along all the economy; second, the inability of depositors to monitor banks (Santos, 2001). This study is interested in looking at how the functioning of credit markets is affected by bank regulations.

The recent international financial crisis triggered a necessary and urgent debate on the restructuring of financial systems. The roles that prudential regulation on capital requirements, official supervision and market discipline should play in achieving the ultimate regulations' purposes of guaranteeing financial stability and supporting economic growth are at the core of the discussion. Despite the current urgency of the issue, such discussion is already in place at least since the revision of the 1988 Basel Capital Accord, which led to a revised framework, the Basel II Capital Accord (Basel Committee, 2004). This accord establishes three bank regulatory pillars, representing capital requirements, supervisory review process, and market discipline. The effort devoted by Basel II in achieving bank regulatory convergence is not without criticisms, such as the high reliance that Basel II puts on supervisors to ask banks to hold capital above the minimum required. The critics[3] see this reliance as an attempt to replace the market by supervisors or by the complicated formulae proposed by Pillar I. Also, the international standard status of Basel II and the widespread trend for its adoption make such an emphasis on supervision a challenge to the ability of developing countries in spending high resources on more sophisticated bank supervisory systems. Moreover, the emphasis on supervision implies the assumption that the public interest is to prevail, which could not be the case in weak institutional environments, where high supervisory discretion could lead to venal and systematic corruption. On the top of that, the current global financial crisis reveals serious problems with the mix between capital regulation, supervision and market discipline. The failure of that mix to avoid such a big crisis is leading many officials and politicians to advocate for a movement towards more regulation and supervision, as well as the critics to Basel II are probably revaluating their views.

[3] For instance, see SFRC (1999), Rochet (2003), Kane (1997, 2002, 2004), Herring (2004).

Our study contributes to the debate on the efficiency of the three mentioned bank regulatory mechanisms by adding empirical evidence on their relative importance, the complementarities among them, as well as their interactions with the institutional environments they are inserted in. Our purpose, similarly to Barth *et al* (2006), is to achieve a better understanding of the forces influencing bank regulatory and supervisory choices and how these are translated into the credit policies adopted by financial institutions. We provide evidence of the effects of the aforementioned broad regulations on loan characteristics such as spread and maturity, using a large sample composed of syndicated loan contracts initiated by 278 large commercial banks around 39 countries, to borrowers in 83 countries, in the period from 1998 to 2006.

The main results indicate that the stringency of capital regulations have an inverse U-shaped relationship with the priced risk measures of loan contracts. Regarding bank supervision, we find that official supervisory power is associated with riskier loan contracts. Both official supervisory power and private monitoring interact negatively with capital stringency to reduce risk term of loans (decrease spread and increase maturity). Given the nonlinear relationships between capital stringency and risk measures (inverse U-shaped with spread and direct U-shaped with maturity) we found that official supervisory power and private monitoring interact differently with capital stringency to influence risk measures of loan contracts, depending on different levels of capital stringency. For low levels of the latter, both supervisory power and private monitoring are substitutes to capital stringency when reducing the risk measures of loans. For high levels of capital stringency, supervisory power and private monitoring are complements to capital to reduce the risk terms of loans. Evidence on interactions between regulations and other country-level factors points that capital stringency decreases priced risk loan characteristics (decreases spread and increases maturity)

especially in countries with high levels of legal enforcement, financial development and competition.

The reminder of the chapter is structured as follows. Section 3.2 describes the related literature and empirical hypotheses to be tested. Section 3.3 describes the sample and variables used to conduct our empirical analyses. Methodology used to derive the results is detailed in Section 3.4. Results are presented in Section 3.5. The final section of the chapter presents the main conclusions of this research and offers a discussion of the significance of our results.

3.2 Related Literature

The purpose of this empirical study is twofold: (i) to investigate the individual effects of bank regulations regarding capital requirements, supervisory power and private monitoring of banks on the characteristics of loan contracts, and (ii) to examine possible interactions between these three broad bank regulations and other institutional country mechanisms affecting the characteristics of loans. Accordingly, in this section we first briefly review the main theories on the separate influence of the three bank regulations on bank lending. Then, we present the theoretical arguments that point to possible interactions, substitutability, complementarities, and trade-offs between those regulations themselves and other mechanisms affecting bank lending, such as competition in the bank industry and country legal and financial systems development. We then concentrate on the empirical related literature. Finally, we propose the empirical hypotheses to be tested in our analysis.

3.2.1 Bank Capital Regulation

Despite the lack of consensus on whether and how banks need to be regulated, two justifications for regulating banks are often presented: the risk of a systemic crisis and the inability of depositors to monitor banks (Santos, 2001). The use of a deposit insurance scheme by governments is probably the most adopted proposal to avoid bank runs. Although very successful in protecting banks from runs, deposit insurance is not without a cost, as it implies moral hazard on the part of banks. That is because the deposit insurance provider bears the risk to protect depositors from losses, which inhibits depositors' incentive to monitor banks. The consequence is an increase in the risk taking incentives of banks. If the insurance premium is not fairly priced, the risk taking incentives are even higher, as the full cost of risk is not internalized by the bank. Such risk-shifting incentive cannot be removed by charging fairly priced insurance premiums given that information asymmetry makes them impossible to be computed (Chan, Greenbaum and Thakor, 1992), or undesirable from a welfare point of view (Freixas and Rochet, 1995). In this context, bank capital regulation arises as a mechanism to prevent bank failures and their potential externalities, by influencing bank risk taking. Nevertheless, theoretical research on the effects of capital regulations on bank performance, risk and stability has produced contradictory results[4]. With respect to this research, a conclusion of VanHoose (2006) states that "the intellectual foundation for bank capital regulation in general and for the proposed Basel II system specifically is not particularly strong. Instead of expanding the scope and complexity of the current system of capital regulation, it may be time to contemplate alternative approaches to bolstering the safety and soundness of the banking system." We depart from VanHoose

[4] Santos (2001) and VanHoose (2006) provide comprehensive reviews of the theoretical literature on the effects of bank capital regulation on the risk-taking behaviour and solvency of banks.

(2006)'s conclusion as a motivation to undertake this empirical research using a more comprehensive scope of bank regulation.

The empirical evidence of the effects of capital regulation on bank lending is not consensual. For instance, different analyses of the credit crunch occurred in the United States in the early 1990s produced contrasting results. Some studies conclude that the introduction of capital requirements resulted in a reduction in loan supply, as a consequence of increase in capital ratios. Peek and Rosengren (1995a, 1995b) conclude that a decrease in loan supply induced by capital regulation, together with lower loan demand caused the decline in lending. Similar evidence is offered by Brinkmann and Horvitz (1995), Furlong (1992), Haubrich and Wachtel (1993), Lown and Peristiani (1996) and Hiuri et *al.* (2002). The contrasting evidence comes from Berger and Udell (1994), who attribute the credit crunch to a decline in loan demand and to other factors affecting loan supply. Wagster (1999) also concludes that other factors excluding capital regulation generated the credit crunch in the U.S. His study looks at other countries and find mixed evidence. The review of Jackson *et al*. (1999) examines many studies looking at the effects of capital regulation on capital ratios and reaches a mixed conclusion: in the short term, banks reduce lending to adjust to a tightened capital requirement, but do not maintain higher capital ratios in the mid term. Ashcraft (2001), and Flannery and Rangan (2004) find little evidence of the influence of U.S. capital regulations on capital ratios, respectively for the 1980s and more recent years.

Concerning the effect of capital regulation on bank risk taking, the evidence is mixed as well, although the majority of studies point to an overall increase in risk after the implementation of the Basel I capital regulation framework. Hendricks and Hirtle (1997) find evidence in favour of risk reducing, but argue that the benefits are likely to be small, as most banks only slightly increase their capital ratios in response to capital

regulations. On a sample of 98 U.S. bank holding companies in the 1975-1986 period, Furlong (1988) concludes that less risk-averse banks did not increase their asset risk in response to the introduction of capital regulation in the 1980s. Sheldon (1996) finds little evidence that Basel I capital regulation reduced asset risk on a cross-country sample in the 1987-1994 period. According to Jackson *et al.* (1999), a weakness of these two studies is that they do not control for many potential influences on bank risk-taking. Barth *et al.* (2004, 2006) minimize this problem by using a sample of survey data across 107 countries, which allows them to include controls for the effects that different country regulatory policies may produce in the functioning of banking systems. Their results regarding whether capital regulation induces banks to take less risk are mixed. Although they find that more stringent capital requirements are related to fewer nonperforming loans, they do not find a relation between stringent capital regulations and the likelihood of a banking crisis.

3.2.2 Bank Supervision

Under the public interest view of regulation[5], bank supervision arises as an activity capable of overcoming inherent failures of financial markets. In such approach to regulation, bank supervisors have the proper incentives, abilities and the necessary

[5] There are two approaches underlying the research on regulation. The public interest approach to bank regulation thinking considers that regulation serves to the public interest of improving social welfare, by boosting economic development, preventing systemic crises and protecting depositors. This approach assumes the existence of market failures and that governments have the incentives and capabilities to overcome those failures. Opposed to that view, the private interest approach arises by viewing regulation as a product, subject to supply and demand forces. In this view, the private interests of the regulator and bankers prevail over the public interest, when determining bank regulations. It is the case for political and/or regulatory capture, which can lead to venal and systematic corruption. In practice, it is reasonable to view regulations to experience a dynamic process of responding to different incentives along the time, fluctuating between the extreme approaches (Kane, 1997). See Barth *et al.* (2006, chapter 2) for a review on public and private interest approaches to regulation.

powers to accomplish their purposes of ensuring safety and soundness of the banking system (Barth *et al.,* 2006). More specifically, supervision plays a role in reducing excessive bank risk-taking and promoting bank performance and stability. In this view, powerful and independent supervisory agencies are desirable, in order to avoid regulators suffering the political pressure of bankers. By contrast, the private interest view assumes that supervisors may use their power to serve either their own private interests or the ones of bankers and politicians. The consequences of powerful supervision in this view are poor bank performance and increased corruption. Research on bank supervision is scarce and limited to few empirical studies and to the discussion of conceptual issues underlying the Basel II's proposal for the supervisory review process, known as Pillar II. By identifying implicit assumptions in some criticisms to the proposal of Pillar II (e.g. SFRC, 2001 and Hamalainen *et al*., 2003), VanHoose (2007) proposes a discussion on three conceptual issues underlying the appropriateness of the supervisory review process. The first issue refers to the question if rules are preferred over discretion in the supervisory process. It is raised by a common criticism that Pillar II proposal gives a lot of discretion to banks and supervisors, which could result in increased risk arbitrage and regulatory forbearance. The second issue is related to the first and asks how tough a policy rule really should be. There is theoretical disagreement whether prompt closing troubled banks is an optimal supervisory policy[6]. The third conceptual issue refers to whether international coordination of regulatory and supervisory rules is appropriate. The existent research on this issue is scarce[7].

Empirical evidence about the effects of supervision on bank lending and risk-taking is very limited. DeYoung *et al*. (2001) find that government supervisory

[6] See Sleet and Smith (2000), Kocherlakota and Shim (2005) and Shim (2006)
[7] See Holthausen and Rønde (2005) and Dell'Aricia and Marquez (2006)

examinations of large commercial banks produce new, value-relevant information. Although debt prices do not immediately reflect this information, the implied regulatory actions are priced by the market. Berger *et al*. (2000) compares the timeliness and accuracy of government assessments of bank condition against market evaluations. They find that supervisors and bond rating agencies both acquire some information that would help the other group forecast changes in bank condition. However, supervisory assessments and market indicators are not strongly interrelated. In addition, supervisory assessments are less accurate than either stock or bond market indicators in predicting future changes in performance. Both studies considered only large U.S. banking firms. By contrast, Barth *et al*. (2006) use a large sample of banks and countries, including emerging ones, to derive conclusions regarding the effectiveness of bank supervision. They find that empowering direct official supervision of banks does not boost bank development.

3.2.3 Private Monitoring of Banks

The reliance on the private monitoring of banks, a mechanism related to market discipline, is argued to be an alternative way to restrict excessive risk-taking behaviour of banks. From the private interest view of regulation, such reliance is argued to have a greater importance, as supervisors and regulators are assumed to succumb to bankers' and politicians' interests. Herring (2004) argues that "one of the principal merits of market discipline is that bank directors and managers are faced with the burden of proving to the market that the bank *is not* taking excessive risks rather than subjecting officials to the burden of proving, in a review process, that the bank *is* taking excessive risks." (pp. 365-366). Hamalainen *et al.* (2003) describe many potential social benefits of market discipline. Among the most important ones, we mention: first, the possible

reduction in moral hazard resulting form deposit insurance; second, the threat of market discipline provides constant pressure on management to improve cost efficiency; third, if the market discipline process is faster than regulatory actions, it may help regulators to screen "bad banks" from "good banks", and promote the aforementioned Herring (2004)'s shift of the burden of proof. Among the potential negative effects of market discipline, the most important is the possibility of a bank run resulting from reactions of fund suppliers to widespread perceptions of higher failure probabilities[8]. Another undesirable effect is when market participants and regulators take misguided reactions as a consequence of persistent false market signals sent by fund suppliers. The market discipline concept applied to banking refers mainly to the reactions of fund suppliers – depositors, debt holders, shareholders – in order to induce banks to solve a perceived deterioration in bank solvency. These reactions may be the reduction in the amount that funds suppliers maintain in the bank, the maintenance of the same amount but at a higher rate of return, or the entire interruption of funds supply to the bank. Some conditions for fund suppliers to be able to engage in market monitoring are necessary, such as the existence of open and active markets capable to provide visibility of bank risk of insolvency to all fund suppliers, regulations promoting bank transparency and the release of correct information at appropriate times, and a no-bailout policy of depositors or banks (Flannery, 2001). Despite the variety of conclusions from the academic research regarding the relative effectiveness and desirability of relying on market discipline as a mechanism of bank regulation, VanHoose (2007) observes that Basel II has ignored the potentially useful signalling roles of market discipline. He warns that market discipline aspects of Basel II represent at best minimal innovations

[8] In the model of Chen and Hasan (2006), greater information transparency of banks tends to boost the likelihood of bank runs, unless bank informational disclosures clarify to depositors that the problem is idiosyncratic.

for most well-developed banking systems. However, he argues that countries with less developed banking systems are more likely to benefit from Basel II's pillar III recommendations.

Turning to the empirical evidence on market discipline in banking, the review of Flannery (1998) of mid 1990s research concludes for the existence of supporting evidence to a role for market discipline in supplementing regulatory supervision. This kind of evidence generally tests if suppliers of funds are able to perceive changes in banks' risk profiles. In this regard, Flannery and Sorescu (1996) show that investors can rationally distinguish among risks taken by U.S. banks, by looking at the spreads between yields on subordinated debt and treasury bonds with the same maturities as indicators of capital adequacy and predictors of bank condition. It is especially true if subordinated debt is perceived as not being guaranteed by the government. Distinguin *et al.* (2006) find evidence that market-based indicators can help predicting the degree of bank stress, as long as the bank does not heavily rely on uninsured deposits. Morgan and Stiroh (2001) examine market spreads on new bonds issued by U.S. banks and bank holding companies in primary markets to conclude that debt markets provide clear signals of asset risk differentials across banks. In evaluating subordinated-debt spreads as indicators of bank risk, Evanoff and Wall (2001) conclude that these are better predictors of regulatory ratings than capital ratios.

3.2.4 Mix and interactions between mechanisms

Although the many criticisms to the proposed approaches of Basel II, its general framework of structuring bank regulation and supervision in three pillars – risk-based capital requirements, supervisory review and market discipline - is widely consensual and accepted. The basic assumption of this framework is that the three pillars will

reinforce each other and result in effective improvements for bank safety and soundness. In other words, they are assumed to be complements. An obvious implicit assumption is that the intended result may not be achieved unless all pillars are sufficiently well designed and structured (VanHoose, 2007). Some authors, like Llewellyn and Mayes (2003), examined the conditions for market discipline and prompt corrective action to be complements. However, little research effort was dedicated to analyze joint interactions among the three regulatory mechanisms. Also, little effort was made by both the academic researchers and the Basel Committee to develop the second and third pillars, which raises concerns regarding the appropriateness of the proposals of Basel II in achieving its purposes. Next, we present the academic contributions to the issue of how the mechanisms of capital requirements, supervision and market discipline mix and interact, and the correspondent implications to bank behaviour.

Substitutability

Calem and Rob (1999) find a role for market discipline in reducing the risk-taking incentives of undercapitalized banks. Milne (2002) claims a role for *ex post* penalties imposed by supervisors in case capital requirements are not fulfilled. He argues that such a mechanism is likely to be more efficient in reducing risk-taking incentives than toughening capital requirements tied to asset risks. In their theory of bank capital based on the financial fragility as essential for banks to create liquidity, Diamond and Rajan (2000) also indicate a role for prompt corrective action, in the presence of deposit insurance. Dowd (2000) points that the problem of financial fragility introduced by Diamond and Rajan (2000, 2001) can be fully solved if banks keep a sufficient large capital cushion. Marini (2003) extends the analysis of Dowd (2000) to conclude that market-capitalized banks are also protected from insolvency

crisis. The arguments of Dowd and Marini offer the conclusion that market-capitalized levels of bank capital can substitute for both supervision and deposit insurance.

Contingent complementarities

Campbell et al. (1992) provide interesting results on the combination of capital requirements and monitoring in the optimal contract: first, as bank assets' risk increases, it is optimal for depositors to increase both capital and monitoring, i.e., the mechanisms are complementary. Second, as incentive problems with monitors increase, depositors should increase capital requirements at the expense of monitoring, i.e., the mechanisms are substitutes.

Complementarities

Some studies explicitly incorporate the mechanisms of the three pillars of Basel II. The dynamic model of Estrella (2004) finds that higher capital requirements only partially align bank behaviour to regulator's objectives. Extra regulatory effort directed to less capitalized banks and market discipline alleviate the problem, although not sufficiently to attain the regulator's first best desired outcome. As proposed by the author, a complete alignment to the regulator's interest can be achieved if a regulatory commitment to an *ex post* penalty is applied. The comprehensive and ambitious study of Decamps *et al*. (2004) proposes a dynamic model based on continuous-time cash flows to examine interactions between the three pillars of Basel II. The authors interpret capital requirements as a closure threshold. They show that market discipline can be used to reduce the closure threshold, especially if there is a risk for regulatory forbearance. Regarding the second pillar, the authors suggest a mechanism of indirect market discipline, where supervisors can modulate the intensity of their interventions

based on reliable signals given by market prices of the securities issued by banks. In his analysis of pillars II and III of Basel II, VanHoose (2007) argues that the market discipline pillar does not go far enough in the right direction, while the supervisory-process pillar goes too far in exactly the wrong direction. He suggests that "the market-discipline pillar would be significantly improved by requiring national regulators to begin studying the informational properties of market signals in bank debt markets for possible use in corrective-action policies" (p. 32).

Interaction between bank regulations and country-level governance

There are some considerations concerning the interaction of bank regulations with other country-level aspects related to the economic and legal environments where banks operate. As previously mentioned, the idea that high reliance on market discipline can substitute for regulatory and supervisory power emerges from the private interest view of bank regulation. An important related issue is whether excessive reliance on market discipline is appropriate for countries with weak legal and financial systems, and poor accounting standards (Barth *et al*., 2006). The public interest view advocates for reliance on official supervisors to monitor the banking systems in weak institutional environments. It is argued that in such settings, great reliance on private monitoring leads to exploitation of small savers and consequently, to less bank development. The counter argument from the private interest view is that powerful supervisors are more likely to benefit private interests precisely in less institutionally developed countries. Caprio and Honohan (2004) go further and claim that for many reasons low developed countries may be better positioned to exercise market discipline: the lower complexity and the size of the banking and financial markets facilitate monitoring; the absence or low credibility of deposit insurance stimulates market monitoring; the presence of many

foreign banks may result in more information disclosure. Barth *et al.* (2006) conclude that only empirical testing can resolve the debate. These authors offer a kind of reconciliation of bank supervision and market discipline when commenting the results of their empirical analysis: "[S]upervision works best when it facilitates market monitoring". Our study also offers a contribution in respect of this.

There is some evidence on the joint effects of bank regulations. Concerning the 1990s U.S. credit crunch, Furfine (2001) concludes that toughened supervision had a larger influence on banks' balance sheet choices than explicit capital requirements. Barrios and Blanco (2003) used different models to assess the response of bank capital to market forces versus capital constraints. They concluded that the 76 Spanish commercial banks in their sample were unconstrained by capital regulation between 1985 and 1991, as the market-based model better fitted the data. Similarly, Beatty and Gron (2001) find that the introduction of risk-based capital regulations did not influence the behaviour of 438 U.S. bank holding companies between 1986 and 1995.

We conclude this section with a brief description of some features of the empirical analysis we perform in this chapter. Our analysis builds on the empirical work of Barth *et al* (2006). However, besides having a much more limited scope than that study, our approach differs from theirs by using transaction-level data across countries, instead of taking essentially a country-level approach. Our study relies on the cross-country surveys on bank regulation and supervision performed by Barth *et al.* (2001, 2006, 2008) as its source of data on bank regulations. These surveys consist of hundreds of rules regarding bank regulation and supervision adopted by more than 100 countries around the world. To measure bank regulatory and supervisory policies, we borrow the approach proposed by those same authors (Barth *et al.*, 2006, chapter 4), which consists in using broader indices as empirical proxies rather than an "examine-every-rule"

approach. They argue that the broader approach is statistically preferred, as many individual rules would render impossible the identification of their independent impact on bank operations. Furthermore, it is also preferred from a theoretical viewpoint, as there are only few broad concepts of bank regulation and supervision. Finally, the broader approach is specifically appropriate for this study, as our focus is to measure how three broad regulatory mechanisms influence some loan contracts features. These mechanisms mirror the Basel II's three pillars framework, although our study is not making an assessment of the specific effectiveness of Basel II. Instead, our empirical approach relies on explanatory variables represented by the indices for *Capital Requirements Stringency*, *Official Supervisory Power* and *Private Monitoring*, suggested by Barth *et al*. (2006), to represent respectively bank capital regulations, supervisory power and market discipline.

3.2.5 Empirical hypotheses

We propose the following hypotheses to be tested in our sample. We take the public interest view to regulation when deriving them. Such approach implies that the hypotheses proposed are not necessarily the ones mainly expected by theory. Our purpose is not favouring the public interest view. On the contrary, it is to impose an arbitrary impartial discipline able to avoid driving the conclusions to any direction. We believe the evidence to be obtained is useful as a test of the theoretically well grounded hypotheses. It is also important in shedding a light on the weak or ambiguously theoretically grounded ones.

From a public interest view, the regulations imposed on banks by countries are mechanisms capable to contain risk-taking behaviour of banks and, ultimately, to help assuring banks' soundness, financial stability and economic growth. In a context of

bank lending across a set of countries, we propose the following hypotheses to examine whether each of the bank regulations measures is associated with loan priced risk characteristics, represented by spread and maturity:

H1*: More stringent capital regulations reduce priced risk characteristics of loan contracts. Hence, they reduce loan spreads and increase loan maturities.*

H2*: Higher official supervisory power reduces priced risk characteristics of loan contracts. Hence, it reduces loan spreads and increase loan maturities.*

H3*: More private monitoring on banks reduces priced risk characteristics of loan contracts. Hence, it reduces loan spreads and increase loan maturities.*

Provided that the influence of bank regulations on bank risk-taking behaviour is not a consensual issue, either from a theoretical viewpoint and the empirical evidence available, we consider checking the existence of nonlinear relationships between bank regulations and the risk characteristics of loan contracts.

Furthermore, given the comprehensiveness of our dataset, we are able to extend our analysis by examining complementarities and interactions between both regulatory mechanisms themselves, and other country factors. For such, we rely on enriching the assessment of the previous hypotheses by introducing interaction terms between bank regulations themselves and between these and country factors such as the levels of bank competition, financial development and legal enforcement, as well as considering sub-samples across these same country factors.

Similarly to Barth *et al* (2006), one limitation of our study is to use bank regulations variables that are constructed based on a survey of statutory powers, which does not necessarily reflect how regulations work on the ground. Accordingly, our findings have to be analyzed with caution. In any case, by conducting econometric analyses on a novel sample that mergers country and transaction-level data, we believe we make a contribution to the literature on the evidence of how bank regulations influence lending practices of banks.

3.3 Data description

The main source of our data is the LPC Reuters *DealScan* database, which provides detailed data on loans made all over the world by banks to large firms. Such loan level information includes many features of loan contracts, such as lender and borrower identities, dates of origination, purpose of loan, deal amounts, number of lenders, lender deal share, spreads, loan maturity, covenants, and borrower sector and ratings. To conduct our cross-country study on bank regulations, we adopt the loan deal as the unit of analysis. At the same time, we are interested in the behaviour of banks. Therefore, our sample selection consisted in taking, whenever possible, the 15 largest commercial banks or banking holding companies in terms of total assets, in 39 of the 49 countries included in the study of La Porta *et al*. (1998)[9]. Besides establishing a limit in the number of countries included in the study, we believe that such selection allows comparability with other cross-country studies, mainly related to the "law and finance" literature. Then, we collected information on all confirmed loan deals originated by

[9] New Zealand was excluded because most banks there are owned by Australian banks. Scarcity of data motivated the exclusion of Colombia, Ecuador, Kenya, Nigeria, Peru, Sri Lanka, Turkey, Uruguay and Zimbabwe.

those banks from 1998 to 2006. Such selection of period is motivated by the availability of bank regulations data, which consist of surveys made by the World Bank in the years 2000, 2003 and 2007 (Barth *et al.*, 2001, 2006, 2008). We assume that country bank regulations reported by those surveys are in place for the following 3-year periods: 1998 to 2000, 2001 to 2003 and 2004 to 2006. Hence, yearly bank regulations variables representing each country's capital requirements stringency, official supervisory power and the level of private monitoring are added to the database. Similarly, other country-level variables are included, namely, the borrower country's sovereign debt rating, the level of legal protection of creditors in borrower country, and proxies for lender country's level of financial development, and borrower country's economic development, economy size, and business cycle. Finally, bank-level characteristics are collected from the *Bankscope* database, and hand-matched with the loan deal level information. Raw data from *DealScan* was filtered to allow only confirmed loans, and to exclude loans made to firms in the financial and in the public sectors (first digit of SIC code equal to 6 or 9). These loans are dropped because the risks of firms in these sectors are argued to be very different from other firms, as they are likely to be government owned or government protected monopolies (Qian and Strahan, 2007). Considering that some banks have no loans reported by *DealScan*, and that in fact less than 15 banks were included for some countries, we ended up with a sample of 46,453 loans originated by 278 banks around 39 countries, to borrowers distributed in 83 countries, during the period from 1998 and 2006. What follows is a description of the variables used in the analyses.

Dependent Variables

The following variables represent the loan contract characteristics selected to be examined if they are affected by bank regulations, after controlling by other country-level, loan-level, lender-specific and borrower-specific characteristics:

- **Spread:** this variable corresponds to the "All-in Spread Drawn" information available for each deal in the *DealScan* database It consists of the base points in excess of the interbank market rate that is asked by lenders to borrowers in a deal. It also incorporates any charged fees associated to the loan. The *Spread* variable is assumed to reflect the risk that a lender prices to the borrower in a specific loan contract.
- **Log of Maturity:** it is the logarithm of the maturity of a loan, expressed in number of months. As well as the *Spread* variable, *Maturity* is supposed to be a contract feature that reflects the risk priced by the lender to the borrower in a loan.

Explanatory Variables

When studying the influence of bank regulations on loan contracts characteristics, we include four different sets of explanatory variables: country-level, lender-specific, borrower-specific, and loan-level. The first set includes country-level variables reflecting: (1) some supply-side factors that may affect the availability of funds and the loan contracts characteristics, i.e., the conditions in which lenders want to extend loans to borrowers. The variables that represent the focus of this study, namely, the country-level bank regulations, are included in this set, as well as institutional variables at the lender country level such as financial development, legal enforcement and bank competition; (2) demand-side factors, such as the level of economic

development, the business cycle, and sovereign credit ratings in borrowers' countries. The second set consists of lender-specific characteristics, such as its size and leverage, which represent supply-side factors at the loan deal level, and likely influence loan contracts features. The third set of explanatory variables refers to borrower-specific characteristics representing both demand-side and credit risk factors, essential to determine loan contracts characteristics. The fourth set of variables includes characteristics of the loans, other than those used as dependent variables, which also relate to demand-side and credit risk factors determining loan contract features. Additionally, year dummies are included as explanatory variables. Appendix B provides a detailed description of all explanatory variables, grouped in the described sets.

Descriptive Statistics

Basic descriptive statistics of the main variables is provided by Table 3.1. It shows that the average spread of the deals is 188.8 basis points over LIBOR, while average maturity is 55.3 months (3.7 on a log scale). The mean deal amount is at 396 millions of US dollars (the mean of the logarithm of deal amount is 18.8), with a high percentage of loans (63%) made to borrowers located in the same country as the lender. Regarding the variables describing banks' characteristics, the average annual total assets of a bank are 204 billions of US dollars (the mean of the logarithm of bank total assets over the whole sample of deals is 20), while mean leverage is at 94%. The variables on regulatory measures indicate that *Capital* stringency has a mean value of 6.4 in a range between 2 and 10, *Official* supervisory power has a mean value of 11.1, ranging from 4 to 14, and *Private Monitoring* has a mean value of 8.8 and ranges from 5 to 11. On the borrowers' side, Table 3.1 indicates that La Porta *et al* (1998).'s *Creditor Rights* index has a mean value of 1.5, ranging from 0 to 4 and that the *Sovereign Rating Score* of

credit risk has a mean value of 2.4, ranging from 1 to 24. Finally, the set of macroeconomic variables related to a borrower country's GDP indicates a wide dispersion of values among the borrowers' countries.

In general, our heterogeneous sample of countries offers high enough variability across the different variables for conducting an econometric analysis. Table 3.2 presents the mean values of bank regulations and other institutional country level variables, for each lender country in our sample, while Table 3.3 shows country mean values of variables describing macroeconomic and creditors' rights conditions of borrower countries.

Table 3.1 – Descriptive Statistics

Variable	*Obs*	*Mean*	*Std. Deviation*	*Minimum*	*Maximum*	*Percentile 10%*	*Percentile 25%*	*Median*	*Percentile 75%*	*Percentile 90%*
Spread (basis points)	32,354	188.80	172.98	-295	15,000	40	75	155	250	350
Log of Maturity (months)	41,965	3.66	0.82	0	10.09	2.48	3.18	4.01	4.09	4.43
Capital	46,453	6.38	1.25	2	10	5	6	6	7	7
Official	46,453	11.14	2.36	4	14	7	9	12	13	13
Private Monitoring	46,453	8.79	1.36	5	11	7	8	9	10	10
Log of Deal Amount	46,453	18.76	1.47	0	24.61	16.86	17.81	18.81	19.74	20.61
Lender Size (Log of Assets)	46,453	20.03	1.06	13.09	21.40	18.75	19.62	20.27	20.81	21.10
Lender Leverage	46,453	0.94	0.03	0.51	1.25	0.91	0.92	0.94	0.96	0.97
Borrower Rating Score*	46,453	1.22	2.13	0	6	0	0	0	3	5
Creditor Rights	46,453	1.49	1.00	0	4	1	1	1	2	3
Financial Development	46,453	0.84	0.42	0	2.01	0.48	0.52	0.85	1.10	1.45
Log of GDP	46,453	8.06	1.56	1.05	9.49	5.70	7.03	9.08	9.26	9.43
Log of GDP per capita	46,453	10.19	0.75	5.95	11.41	9.51	10.22	10.46	10.54	10.64
GDP growth	46,453	3.06	1.81	-13.13	30.55	0.88	1.99	3.04	3.85	4.53
Sovereign Rating Score	46,453	2.43	2.87	1	24	1	1	1	3	6
Same Country	46,453	0.63	0.48	0	1	0	0	1	1	1

* Zero if unrated.

Table 3.2 – Lender Country Descriptive Statistics (Mean of country-specific variables in the 1998-2006 period)

	Country	*Capital*	*Official*	*Private Monitoring*	*Financial Development*	*Rule of Law*	*Number of Banks*
1	ARGENTINA	7.5	9.8	8.3	0.17	-0.37	88
2	AUSTRALIA	6.4	11.5	9.8	0.88	1.77	52
3	AUSTRIA	7.8	12.1	6.0	1.03	1.83	921
4	BELGIUM	6.6	11.1	7.0	0.75	1.41	112
5	BRAZIL	6.6	13.7	8.7	0.30	-0.34	181
6	CANADA	4.0	7.5	9.0	1.02	1.77	63
7	CHILE	5.6	10.6	7.3	0.59	1.16	28
8	DENMARK	7.1	8.9	9.3	1.10	1.87	181
9	EGYPT	5.0	13.2	9.0	0.48	-0.06	41
10	FINLAND	4.7	7.7	9.1	0.59	1.89	10
11	FRANCE	6.0	7.3	6.2	0.86	1.35	366
12	GERMANY	6.3	8.8	7.5	1.13	1.70	1999
13	GREECE	4.9	10.6	7.2	0.57	0.74	27
14	HONG KONG	6.0	11.0	8.5	1.53	1.18	164
15	INDIA	7.6	9.2	6.9	0.29	0.12	96
16	INDONESIA	5.9	12.3	8.4	0.28	-0.85	148
17	IRELAND	4.9	10.5	9.2	1.09	1.61	53
18	ISRAEL	5.5	8.3	9.6	0.80	0.88	22
19	ITALY	5.4	6.6	7.2	0.74	0.72	845
20	JAPAN	6.4	12.0	9.4	1.44	1.39	248
21	JORDAN	7.7	10.1	7.4	0.72	0.37	20
22	KOREA (South)	4.5	10.5	10.0	0.79	0.72	20
23	MALAYSIA	3.9	11.6	9.3	1.28	0.46	29
24	MEXICO	7.4	9.5	7.9	0.17	-0.45	38
25	NETHERLANDS	5.3	7.1	8.2	1.55	1.75	586
26	NORWAY	7.5	8.7	7.5	0.70	1.93	15
27	PAKISTAN	8.5	13.3	8.5	0.24	-0.82	38
28	PHILIPPINES	5.6	11.3	8.5	0.35	-0.46	45
29	PORTUGAL	6.8	13.6	7.5	1.22	1.16	59
30	SINGAPORE	7.2	9.6	8.9	1.03	1.62	125
31	SOUTH AFRICA	8.3	6.4	9.2	0.65	0.15	51
32	SPAIN	9.6	9.6	8.3	1.03	1.25	286
33	SWEDEN	2.9	6.3	6.9	0.74	1.83	25
34	SWITZERLAND	6.2	13.6	8.1	1.61	1.98	370
35	TAIWAN	5.8	11.3	8.3	.	0.84	40
36	THAILAND	5.6	9.7	8.3	1.14	0.24	26
37	UNITED KINGDOM	6.7	10.1	9.6	1.34	1.73	394
38	USA	6.7	13.0	9.2	0.51	1.60	8697
39	VENEZUELA	3.9	12.1	5.6	0.10	-0.90	24

Table 3.3 – Borrower Country Descriptive Statistics (Number of loans and mean of variables across the 1998-2006 period)

	Country	Loans	Creditor Rights	GDP (bn USD)	GDP per capita	GDP growth	Sovereign Score
1	Argentina	178	1	220	5,939	2.80	18.89
2	Australia	1,218	1	500	25,346	3.55	2.56
3	Austria	42	3	241	29,761	2.26	1.00
4	Azerbaijan	5	-	8	970	12.28	12.25
5	Bahrain	19	-	9	13,444	6.51	8.00
6	Belgium	128	2	292	28,156	2.33	3.11
7	Bolivia	4	-	9	994	3.26	16.00
8	Brazil	356	1	718	4,096	2.57	13.67
9	Bulgaria	19	-	18	2,311	3.89	11.71
10	Cameroon	2	-	13	766	4.05	15.00
11	Canada	1,490	1	837	26,670	3.46	2.00
12	Chile	213	2	88	5,653	3.94	6.78
13	China	293	-	1,549	1,205	9.21	6.89
14	Colombia	51	0	97	2,241	2.64	11.22
15	Costa Rica	8	-	17	4,256	5.34	12.00
16	Croatia	38	-	27	6,054	4.00	10.22
17	Cyprus	5	-	12	16,970	3.75	4.50
18	Czech Republic	67	-	84	8,233	2.87	7.56
19	Denmark	64	3	201	37,423	2.17	1.67
20	Dominican Rep.	1	-	21	2,548	6.00	14.00
21	Ecuador	4	4	27	2,082	3.37	16.67
22	Egypt	46	4	89	1,350	5.03	10.56
23	El Salvador	9	-	14	2,209	2.91	11.00
24	Estonia	7	-	9	6,445	7.81	7.50
25	Finland	140	1	153	29,366	3.77	1.11
26	France	1,225	0	1,675	27,987	2.31	1.00
27	Germany	770	3	2,323	28,212	1.44	1.00
28	Ghana	8	-	8	406	4.89	14.50
29	Greece	195	1	175	15,898	4.09	6.56
30	Hong Kong	580	4	170	25,265	3.74	4.33
31	Hungary	51	-	72	7,074	4.42	7.67
32	Iceland	19	-	11	36,989	4.60	4.00
33	India	239	4	559	538	6.53	11.14
34	Indonesia	109	4	216	1,019	2.69	14.89
35	Iran	39	-	134	2,042	4.71	13.75
36	Ireland	94	1	135	34,184	7.24	1.11
37	Israel	24	4	118	18,274	3.58	7.00
38	Italy	406	2	1,393	24,257	1.50	3.44
39	Jamaica	2	-	8	3,133	0.92	14.00
40	Japan	6,069	2	4,299	33,819	1.12	2.44
41	Kazakhstan	31	-	34	2,249	7.48	11.44
42	Korea (South)	699	3	583	12,286	4.37	7.22
43	Kuwait	15	-	48	18,479	5.80	4.78
44	Latvia	4	-	11	4,551	7.75	8.22
45	Lithuania	11	-	17	4,799	6.54	9.22
46	Luxembourg	51	-	27	59,068	5.40	1.00
47	Malaysia	412	4	107	4,401	4.42	8.67
48	Mali	3	-	4	330	5.09	16.00
49	Malta	3	-	5	11,753	1.29	6.00
50	Mexico	381	0	608	6,089	3.62	10.56
51	Netherlands	558	2	488	30,389	2.59	1.00
52	New Zealand	129	3	73	18,396	3.04	2.20
53	Nigeria	3	4	67	518	7.32	13.00
54	Norway	197	2	213	46,757	2.70	1.00
55	Panama	32	-	13	4,226	5.08	11.00
56	Papua New Guinea	8	-	4	747	0.82	14.57
57	Peru	39	0	64	2,447	3.88	12.38
58	Philippines	190	0	83	1,051	4.18	11.50
59	Poland	100	-	217	5,669	4.26	8.11
60	Portugal	53	1	143	13,761	2.25	3.00
61	Romania	57	-	59	2,706	2.66	13.11
62	Russia	288	-	456	3,147	5.06	12.67
63	Saudi Arabia	19	-	216	10,023	3.35	5.50
64	Serbia	1	-	20	2,475	2.30	13.00
65	Singapore	398	4	99	24,010	5.39	1.56
66	Slovakia	30	-	31	5,731	4.37	9.75
67	Slovenia	13	-	29	14,317	4.21	5.44
68	South Africa	66	3	166	3,655	3.45	9.78
69	Spain	757	2	797	19,083	3.83	1.78
70	Sri Lanka	1	3	18	973	4.87	13.00
71	Sweden	250	2	291	32,532	3.22	2.22
72	Switzerland	209	1	304	42,144	1.92	1.00
73	Taiwan	1,039	2	315	14,037	4.38	5.00
74	Thailand	366	3	144	2,270	2.79	9.44
75	Tunisia	15	-	23	2,393	4.88	9.33
76	Turkey	79	2	316	4,907	4.44	14.00
77	Turkmenistan	1	-	9	1,934	12.24	15.00
78	USA	23,432	1	10,501	36,553	3.12	1.00
79	Ukraine	30	-	54	1,134	4.65	14.17
80	United Kingdom	2,167	4	1,737	29,236	2.85	1.00
81	Uruguay	10	2	18	5,350	1.84	10.00
82	Venezuela	53	-	113	4,536	3.01	14.00
83	Vietnam	16	-	38	476	7.12	13.00
	Total	46,453					

Initial evidence of the correlation between variables is shown in Table 3.4. Remarkably, the variable for *Capital* requirements stringency shows a slightly negative correlation with the loan *Spread*, which suggests that, when forced to improve their level of capitalization, banks become sound and can afford to demand lower interest rates to borrowing firms. Concerning the other variables of bank regulations (*Official* supervisory power and *Private Monitoring*), they are positively correlated with *Spread*, and negatively correlated with loan *Maturity*. Hence, contrary to the *Capital* regulation measure, banks seem to transfer the pressure they suffer from *Official* supervision and *Private Monitoring* to their loans by increasing loan interest rates and shortening loan maturities. It is noticeable the positive correlations between bank regulations themselves, especially *Capital* with *Official* (26%) and *Official* with *Private Monitoring* (43%). In principle, these correlations seem to support the bank regulatory policy approach of reinforcing mechanisms designed to influence bank behaviour. Regarding other country level controls, the level of *Financial Development* of the lender country has respectively small negative and positive correlations with *Spread* and *Maturity*, suggesting that the higher the level of *Financial Development*, the less risky are loan contracts. Turning to borrower country-specific controls, we notice that the *Creditor Rights* variable is weakly negatively correlated with *Spread* and positively correlated with *Maturity*. It might indicate that protecting creditors is beneficial in terms of reduction of risk taking in lending. Finally, given the extremely high negative correlation between borrower country *Sovereign Credit Score* and *Log of GDP per capita* (-88%), we decided to not include the last variable in the regressions to avoid problems of multicollinearity.

Table 3.4 – Correlation Matrix (Sample of 46,453 loans made by 278 banks of 39 countries, in the 1998-2006 period)

	Spread	Matur.	Capital	Official	Private Monit.	Deal amount	Lender Size	Lender Lever.	Borr. Score	Credit. Rights	Fin. Devel.	Log of GDP pc	GDP Growth
Spread	1												
Log of Maturity	0.15	1											
Capital	-0.04	0.10	1										
Official	0.03	-0.11	0.26	1									
Private Monitoring	0.05	-0.03	0.12	0.43	1								
Log of Deal Amount	-0.17	0.06	0.08	-0.13	-0.03	1							
Lender Size	0.00	-0.05	0.19	-0.01	0.09	0.20	1						
Lender Leverage	-0.08	0.03	-0.14	-0.56	-0.39	0.11	0.24	1					
Borrower Rating Score	0.04	0.01	0.06	0.05	0.01	0.38	0.17	-0.04	1				
(borrower) Cred. Rights	-0.06	0.06	-0.07	-0.09	0.03	-0.04	-0.12	0.16	-0.21	1			
(lender) Fin. Develop.	-0.03	0.03	-0.09	-0.33	0.10	0.12	0.23	0.50	-0.04	0.27	1		
(borrower) Log GDP pc	0.02	-0.09	0.08	0.17	0.17	0.07	0.32	-0.10	0.17	-0.13	-0.05	1	
(borrower) GDP growth	-0.04	0.13	0.14	-0.06	-0.12	0.02	-0.15	-0.05	-0.02	0.00*	-0.09	-0.33	1
(borrower) Sov. Score	0.01	0.06	-0.08	-0.12	-0.10	-0.13	-0.23	0.12	-0.20	0.11	0.07	-0.88	0.20

* Not Significant (at the 5% level).

3.4 Methodology

Our sample is structured in individual observations of loan deals originated across a 9-year period. One or more banks participate in each deal, and each bank participates in more than one deal, in each year[10]. Therefore, the loan deal is the level of analysis that allows the best use of the information available, regarding each individual loan characteristics[11]. Each loan deal is a unique event that produces the characteristics of a loan contract and for such it is treated as a separate individual. This invalidates any possibility of using fixed effects techniques across deals.

We concluded that OLS regression is the method of analysis more suitable to our sample. We pooled all individual observations distributed across the 1998-2006 period to undertake single regressions. Year dummies were included in all regressions to take into account possible cyclical and time specific factors not captured by the explanatory variables. It is assumed that observations are independent across banks, but not necessarily independent within the same bank. Hence, robust standard errors clustered by banks are reported in all regressions.

We recognize that many loan characteristics are jointly determined, which raises a concern for possible endogeneity of regressors if those characteristics are used as explanatory variables. We minimize this issue by simply restricting the loan-specific explanatory variables to the deal amount and dummies for most common deal purposes

[10] Although the same loan may be extended by many banks (e.g., a syndicated loan), there is no loan replication in the sample, i.e., a loan deal is included only once.

[11] An alternative analysis could be panel regressions on bank-level data across the 1998-2006 period. That would require the aggregation of information about the deals in which a bank participates in each year. Such aggregation, however, would imply losing of information.

and deal types (see Appendix B). We do not use loan *Spread* or *Maturity* as independent variables, i.e., each one appears only once in each regression, always as a dependent variable. Otherwise, more sophisticated techniques would be required, instead of plain OLS regressions. We also believe that the problem of omitted variables as a source of endogeneity is minimized with the use of a comprehensive set of regressors grouped in country-level, lender-specific, borrower-specific, and loan-level explanatory variables representing supply and demand side factors affecting loan contract features. Problems of reverse causality are not a concern, as the majority of our explanatory variables are at the country-level, whereas the dependent variables are at the transaction level.

The cross-country characteristic of our sample reveals another source of concern, which is the high dispersion in the number of observations per country. High economic developed lender countries have in general much more observations than low developed ones. For example, banks in the U.S. participate in 39 % of the loans. A problem exists if these banks drive the overall results by putting more weight on the country explanatory variables. To tackle this problem, we performed a robustness check by running all the regressions excluding U.S. lenders. The (unreported) results are not substantially changed, and validate the conclusions of this chapter.

3.5 Results

To test hypotheses *H1* to *H3* proposed in Section 3.2, we ran OLS regressions of loan *Spread* and *Maturity* on bank regulations variables, while controlling for the country, lender, borrower and loan specific factors described in Section 3.3. The regressions are for the whole period (1998-2006), and encompass the three Barth *et al.*

(2001, 2006, 2008) surveys sub-periods of 1998-2000, 2001-2003 and 2004-2006. Results are in Table 3.5.

Table 3.5 – Relationship between Bank Regulations and Loan Contracts Characteristics
Dependent variables in columns. OLS regressions[+] over the period 1998-2006. Robust standard errors clustered by banks are in parentheses. Constant, year dummies and other loan-specific controls (industry sector, loan purpose and loan type) are omitted.

	Explanatory	*Spread*		*Log of Maturity* [a]	
	Variables	*R1*	*R2*	*R3*	*R4*
	Lender Country's Bank Regulations				
1	Capital	-6.63 ***	19.26 *	4.10 ***	-7.97 **
		(2.05)	(10.85)	(1.00)	(3.39)
2	Capital ^2		-2.05 **		0.95 ***
			(0.83)		(0.28)
3	Official	-0.02	-0.74	-2.12 ***	-1.72 ***
		(2.58)	(2.69)	(0.58)	(0.55)
4	Private Monitoring	1.62	0.20	-0.31	0.28
		(3.26)	(3.08)	(0.98)	(0.92)
	Lender, borrower and loan specific				
5	Lender Log (Assets)	0.32	-0.98	-2.60 **	-1.99 *
		(3.13)	(3.04)	(1.01)	(1.06)
6	Lender Leverage	-2.24	-1.94	-0.85	-0.91
		(2.61)	(2.61)	(0.80)	(0.79)
7	Borrower Rating	6.81 ***	6.78 ***	2.46 ***	2.46 ***
		(0.79)	(0.77)	(0.50)	(0.49)
8	Log (Deal Amount)	-20.83 ***	-20.90 ***	6.47 ***	6.41 ***
		(1.27)	(1.27)	(1.08)	(1.08)
9	Same Country	-12.10 **	-12.15 **	-1.71	-1.37
		(5.15)	(5.11)	(3.50)	(3.46)
	Borrower Country Specific (except [b]*)*				
10	Creditor Rights	-1.91	-2.35	-0.16	0.10
		(1.76)	(1.72)	(1.01)	(0.96)
11	Creditor Rights missing	-2.54	-5.37	-0.23	1.13
		(10.03)	(9.90)	(4.88)	(4.82)
12	Log (GDP)	19.35 ***	18.98 ***	-4.48 ***	-4.29 ***
		(1.94)	(1.88)	(0.82)	(0.81)
13	GDP growth	-4.33 ***	-4.20 ***	1.67 ***	1.58 ***
		(1.05)	(1.05)	(0.49)	(0.49)
14	Sovereign Credit Risk	7.15 ***	7.09 ***	-2.82 ***	-2.79 ***
		(1.05)	(1.04)	(0.66)	(0.66)
15	Lender Country Fin. Develop. [b]	-12.81	-14.75	3.03	4.05
		(10.98)	(11.14)	(3.45)	(3.59)
Observations		32,354	32,354	41,965	41,965
R-squared		0.21	0.21	0.35	0.35

[+] Significance levels: *** 1%, ** 5%; * 10%
[a] Coefficients and standard errors of Log (Maturity) regressions are multiplied by 100.

Regression *R1* of Table 3.5 shows that *Capital* requirements stringency is negatively related to loan *Spread.* However, the inclusion of a quadratic term in

regression *R2* of Table 3.5 reveals an inverse U-shaped relationship between *Capital* requirements and *Spread*, with the maximum *Spread* occurring at a *Capital* level of 4.9, which is in the 10%-quantile of the sample. It means that countries with low or high levels of *Capital* stringency are the ones that experience lower *Spread*, whereas intermediate levels of *Capital* are associated with higher loan *Spread*.

The results concerning the effect of *Capital* on loan *Maturity* are very similar. Regression *R4* in Table 3.5 shows a U-shaped relationship between *Capital* requirements and *Maturity*, with minimum *Maturity* at a *Capital* level of 4.2, which is also in the 10%-quantile of the sample. It means that loans in countries with low or high levels of *Capital* stringency experience longer maturities.

Respectively for loan *Spread* and *Maturity*, the inverse and direct U-shaped relationships with *Capital* stringency found in Regressions *R2* and *R4* in Table 3.5, reveal a consistency between loan spread and maturity as risk measures. Theoretically, it may be supported by the so-called "signalling hypothesis" (Dennis *et al.*, 2000), by which a longer maturity is a signal of good credit quality, which in turn translates to a lower loan rate.

Summing up, these results show an inverse U-shaped relationship between loan risk characteristics and *Capital* requirements stringency: low priced risk terms of loan contracts, represented by low *Spread* and long *Maturity*, are associated with either low or high *Capital* requirements stringency, while loan contracts with higher risk characteristics prevail when the stringency of *Capital* regulations is moderate. Although consistent, these results do not unambiguously support hypothesis *H1*. For medium to high levels of *Capital* stringency, risk measures behave as proposed by the public interest view of regulation implicit in *H1*, i.e., risk measures decrease as *Capital* stringency grows. Nevertheless, the low risk reflected in loan contracts in countries with

low *Capital* stringency and its increasing behaviour up to medium levels of *Capital* stringency threatens this view, although it is well grounded in some theoretical models, notably the ones that emphasize the role of banks as monitors for moral hazard risks. For instance, Besanko and Kanatas (1996) argue that the issuance of equity to meet capital requirements decrease loan monitoring incentives as a result of the dilution of insiders' shareholders stake. One of the consequences is higher loan loss probabilities, which reflect in higher spreads. Another interpretation for the increasing relationship between risk measures and capital stringency for low to medium levels of the latter is that banks react to moderate capital regulations stringency by increasing spreads and shortening maturities, without changing their credit policies in the direction of strengthening loan screening and monitoring, which in turn would result in less risky loan contracts. Under this interpretation, only when capital regulations stringency is sufficiently large, banks strengthen their credit policies. A third possible explanation for the observation of riskier loan contracts at moderate stringency of capital regulations may be that incentives to risk-shifting are greater at higher probabilities of default deriving from moderate levels of capital stringency. By contrast, at high stringency of capital regulations, probabilities of default are lower, resulting in lower incentives to risk-shifting and less risky loan contracts.

Regarding the other regulatory measures, we do not find any relationships between loan *Spread* and *Official* supervisory power or *Private Monitoring*. However, *Official* supervisory power has a significant negative impact on loan *Maturity*. Together, the evidence found is against hypothesis *H2*, while hypothesis *H3* is not supported. Concerning the role of bank supervision, it suggests that the private interest view prevails, in the sense that more empowered supervisors are associated to riskier bank lending, resulting in shorter maturities of loan contracts. Another interpretation may be

that official supervision induces more conservative behaviour on the part of banks, which mitigate risk through the reduction of loan maturity. More conclusions on the effects of the three bank regulatory indices on loan contracts characteristics are given later in this section, when interactions between them are introduced.

Concerning control variables, borrowers with poor senior debt *Rating* obtain funds through loans with higher spreads, according to regressions *R1* and *R2* in Table 3.5. These expected results for *Spread* contrast with the opposed ones obtained for loan *Maturity*. However, consistently with Diamond's (1991) model, borrowers may use short loan maturity as a way to improve their ratings. Note that we found lower spreads for better rated firms, but also shorter maturities, as lenders may want to update such favourable credit conditions to borrowers in a frequent basis, particularly larger banks, that have less soft information (negative coefficient for *Lender Assets* in regression *R3* of Table 3.5). The coefficient for *Log of Deal Amount* suggests that larger loan amounts are associated with loan contracts in better terms, which are captured by lower spreads and longer loan maturities. In addition, there is evidence that lower spreads are charged in loans extended to borrowers located in the same country as the lender, which suggests that problems of information asymmetry influence the risk terms of loan contracts. Concerning country-specific variables, the higher (worse) the *Sovereign Credit Risk*, the higher the loan contract risk measures (higher the *Spread* and shorter the *Maturity*), which is an expected result. Surprisingly, the variable for the economy size of borrower country, given by *Log(GDP)*, has a positive effect on risk measures. On the other hand, variable *GDP Growth* reduces spreads and increases maturities, which supports an expected relationship between relaxed risk pricing and growth cycles. The lender country level of *Financial Development* does not enter significantly to

explain neither loan *Spread* nor *Maturity*. However, further analyses are offered for this variable later.

Next, we seek to examine how interactions between bank regulations may affect loan spreads and maturity. We included interaction terms in the previous regressions and reported only the significant results in Table 3.6. From regression *R3* in Table 3.6, we found again that *Official* supervisory power linearly decreases loan *Maturity*, but it interacts with *Capital* stringency to positively influence loan *Maturity*. Given the quadratic relationship between *Capital* and *Maturity*, we conclude that for low levels of *Capital*, where *Maturity* decreases with *Capital*, the opposite (positive) sign of the interaction term (*Capital*Official*) means that *Capital* decreases *Maturity* more for low levels of *Official*. In other words, it suggests that in countries where supervisory power is high, more stringent capital regulations are less prone to increase risk by decreasing maturity, which means these bank regulations work as substitutes. For higher levels of Capital, where *Maturity* increases with *Capital*, *Official* reinforces *Capital* to increase loan *Maturity*. Summing up, for low levels of capital stringency, official supervisory power counteracts with capital regulation to lower the decrease in loan maturity, while for high levels of capital stringency, the mechanisms reinforce each other to increase maturity.

Table 3.6 –Effect of Interactions between Bank Regulations on Loan Spread and Maturity
Dependent variables: Spread and Log(Maturity). OLS regressions[+] over the period 1998-2006. Robust standard errors clustered by banks are in parentheses. Constant, year dummies and other loan-specific controls (industry sector, loan purpose and loan type) are omitted.

	Explanatory Variables	*Spread* *R1*	*Log of Maturity* [a] *R2*	*R3*
	Lender Country's Bank Regulations			
1	Capital	47.07 ***	-16.39 ***	-12.91 ***
		(11.48)	(4.50)	(4.37)
2	Capital^2	-1.71 **	0.87 ***	0.78 ***
		(0.84)	(0.31)	(0.28)
3	Official	-1.20	-1.57 ***	-6.78 ***
		(2.26)	(0.56)	(2.18)
4	Private Monitoring	22.97 ***	-6.32 **	0.72
		(6.15)	(2.51)	(0.93)
5	Capital x Official			0.79 ***
				(0.30)
6	Capital x Private Monitoring	-4.03 ***	1.17 **	
		(1.29)	(0.48)	
	Lender, borrower and loan specific			
7	Lender Log (Assets)	1.08	-2.52 **	-2.17 **
		(3.15)	(1.11)	(1.06)
8	Lender Leverage	-3.22	-0.55	-0.60
		(2.72)	(0.74)	(0.74)
9	Borrower Rating	6.72 ***	2.48 ***	2.41 ***
		(0.78)	(0.49)	(0.48)
10	Log (Deal Amount)	-20.75 ***	6.34 ***	6.37 ***
		(1.25)	(1.09)	(1.08)
11	Same Country	-10.75 **	-1.52	-1.39
		(5.11)	(3.48)	(3.46)
	Borrower Country Specific (except [a]*)*			
12	Creditor Rights	-2.49	0.13	0.29
		(1.74)	(0.95)	(0.93)
13	Creditor Rights missing	-5.98	1.28	1.27
		(9.83)	(4.83)	(4.77)
14	Log (GDP)	18.73 ***	-4.25 ***	-4.28 ***
		(1.84)	(0.81)	(0.79)
15	GDP growth	-4.43 ***	1.61 ***	1.53 ***
		(1.05)	(0.49)	(0.49)
16	Sovereign Credit Risk	7.06 ***	-2.76 ***	-2.74 ***
		(1.02)	(0.66)	(0.65)
17	Lender Country Fin. Develop. [a]	-13.42	3.91	3.25
		(10.21)	(3.70)	(3.41)
Observations		32,354	41,965	41,965
R-squared		0.21	0.35	0.35

[+] Significance levels: *** 1%, ** 5%; * 10%

[a] Coefficients and standard errors of Log (Maturity) regressions are multiplied by 100.

The evidence on interactions between capital stringency and private monitoring to influence risk comes both from spread and maturity measures. Regressions *R1* and *R2* in Table 3.6 convey the same message: for low levels of capital stringency, where *Spread* increases and *Maturity* decreases with *Capital*, *Capital* increases risk measures more for low levels of *Private Monitoring*; for high levels of capital stringency, *Private Monitoring* helps *Capital* to reduce loan risk characteristics (decreases spread and increases maturity).

We conclude that the evidence regarding interactions between bank regulations is mixed. On the one hand, *Capital* and *Official* complement each other to reflect less risky loan contracts (through increasing loan *Maturity*) only when the level of *Capital* stringency is high. Similarly, *Capital* and *Private Monitoring* complement each other to reduce loan contract risk measures (through decreasing *Spread* and increasing *Maturity*) only when *Capital* stringency is high. On the other hand, *Official* and *Private Monitoring* behave as substitutes to *Capital* in reducing loan contracts risk measures when a country's level of *Capital* stringency is low.

Results in Tables 3.7 to 3.9 provide evidence on interactions between regulations and other country-level factors. We split the sample in sub-samples of low and high *Rule of Law*, lender country *Financial Development*, and *Competition* (measured by lender country's logarithm of number of banks), according to their medians across lender countries. Concerning the influence of *Capital* stringency variable on loan contracts risk characteristics, the results show a sharp contrast between sub-samples of low and high values of those lender country variables. Regressions in second, fourth and sixth columns of both Tables 3.7 and 3.8 point that capital stringency decreases priced risk loan characteristics (i.e., decreases *Spread* and increases *Maturity*) especially in lender countries with high levels of legal enforcement (measured by *Rule of Law*),

financial development and competition. These findings are very reasonable, as they highlight the importance of a country's levels of financial development, enforcement of law, and banking industry competition, as mechanisms that enable the effectiveness of capital regulations in reducing loan risk terms.

Table 3.7 –Bank Regulations and Loan Spread: sub-samples of high and low lender country Rule of Law, Financial Development and Competition.

Dependent variable: Spread. OLS regressions[+] over the period 1998-2006. Robust standard errors clustered by banks are in parentheses. Constant, year dummies and other loan-specific controls (industry sector, loan purpose and loan type) are omitted.

	Explanatory	*Rule of Law*		*Financial Development*		*Competition*	
	Variables	*Low*	*High*	*Low*	*High*	*Low*	*High*
	Lender Country's Bank Regulations						
1	Capital	-0.66	-6.02 **	-0.38	-6.63 ***	-6.30 **	-6.03 **
		(5.92)	(2.32)	(3.69)	(1.81)	(3.00)	(2.48)
2	Official	11.76 **	0.34	-6.63 **	-1.43	0.13	1.49
		(4.55)	(2.87)	(2.94)	(2.41)	(2.64)	(3.27)
3	Private Monitoring	-3.89	1.48	7.77 *	-1.71	-12.75 **	2.18
		(7.01)	(3.30)	(4.04)	(2.94)	(5.91)	(4.17)
	Lender, borrower and loan specific						
4	Lender Log (Assets)	-17.51 **	-1.16	-2.21	-9.66 **	-11.02 **	-3.03
		(8.50)	(3.86)	(6.05)	(4.78)	(5.20)	(4.14)
5	Lender Leverage	4.33 **	-2.46	-4.79	4.56 **	4.41 ***	-1.83
		(1.89)	(3.09)	(4.52)	(1.94)	(1.63)	(2.91)
6	Borrower Rating	3.96	6.68 ***	6.37 ***	8.06 ***	9.39 ***	6.53 ***
		(10.44)	(0.78)	(1.10)	(1.40)	(1.81)	(0.82)
7	Log (Deal Amount)	-5.51	-21.49 ***	-23.35 ***	-16.77 ***	-13.74 ***	-20.97 ***
		(4.77)	(1.26)	(1.44)	(2.05)	(3.48)	(1.29)
8	Same Country	-3.09	-12.95 **	-33.21 ***	-16.92 ***	9.69	-15.50 **
		(15.58)	(5.50)	(10.92)	(6.20)	(10.35)	(6.22)
	Borrower Country Specific (except [a])						
9	Creditor Rights	-12.36 *	-2.65	-5.76	0.46	-3.79	-3.28
		(7.03)	(2.03)	(4.21)	(1.88)	(5.38)	(2.05)
10	Creditor Rights missing	-89.88 ***	0.15	-10.10	-11.53	-75.33 ***	-1.33
		(32.31)	(9.96)	(11.22)	(12.53)	(24.87)	(10.09)
11	Log (GDP)	10.92 *	18.51 ***	23.09 ***	13.83 ***	25.07 ***	17.67 ***
		(5.68)	(1.88)	(2.90)	(1.81)	(3.53)	(2.02)
12	GDP growth	2.50	-4.77 ***	-6.23 ***	-1.56	2.48	-4.69 ***
		(2.28)	(1.07)	(1.67)	(1.29)	(1.70)	(1.09)
13	Sovereign Credit Risk	11.27 ***	6.57 ***	5.48 ***	6.81 ***	14.57 ***	6.17 ***
		(2.79)	(1.14)	(1.13)	(1.40)	(2.31)	(1.10)
14	Lender Country Fin. Develop. [a]	105.19 **	-12.41	-14.06	16.87	51.59	-12.95
		(47.36)	(11.39)	(66.91)	(13.37)	(35.21)	(12.52)
Observations		1,674	30,514	16,531	14,028	2,638	29,666
R-squared		0.23	0.21	0.18	0.26	0.24	0.21

[+] Significance levels: *** 1%, ** 5%; * 10%

From the regressions in third column of Table 3.7, and first and third columns of Table 3.8, we conclude that private monitoring increases risk characteristics of loan contracts in countries with poor developed legal and financial systems. Such evidence on private monitoring supports the public interest view of regulation, according to which it is not recommended to rely on the external monitoring of markets to contain bank risk taking when financial development is not high enough.

Table 3.8 –Lender Country Bank Regulations and Loan Maturity: sub-samples of high and low lender country Rule of Law, Financial Development and Competition.

Dependent variable: Log of Maturity. OLS regressions[+] over the period 1998-2006. Robust standard errors clustered by banks are in parentheses. Constant, year dummies and other loan-specific controls (industry sector, loan purpose and loan type) are omitted. All coefficients and standard errors are multiplied by 100.

	Explanatory Variables	*Rule of Law*		*Financial Development*		*Competition*	
		Low	*High*	*Low*	*High*	*Low*	*High*
	Lender Country's Bank Regulations						
1	Capital	-0.86	4.55 ***	-0.39	3.95 ***	-0.06	4.84 ***
		(1.73)	(1.30)	(1.57)	(0.59)	(1.00)	(1.50)
2	Official	-1.55	-2.49 ***	-0.11	-3.07 ***	-4.78 ***	-2.45 ***
		(1.37)	(0.64)	(0.90)	(0.85)	(1.17)	(0.76)
3	Private Monitoring	-8.22 ***	0.12	-7.45 ***	-1.55	-1.82	-0.11
		(2.22)	(0.98)	(1.73)	(0.95)	(1.94)	(1.22)
	Lender, borrower and loan specific						
4	Lender Log (Assets)	1.43	-0.26	-2.95 *	-4.26 ***	-2.86	0.01
		(2.78)	(1.60)	(1.51)	(1.31)	(2.07)	(1.57)
5	Lender Leverage	0.90	-1.33	-1.24	2.28 ***	2.30 **	-1.50
		(0.62)	(0.98)	(0.91)	(0.87)	(0.91)	(0.95)
6	Borrower Rating	-3.04	2.36 ***	1.60 ***	2.15 ***	1.41	2.40 ***
		(2.19)	(0.48)	(0.36)	(0.53)	(0.91)	(0.50)
7	Log (Deal Amount)	8.98 ***	5.96 ***	9.92 ***	2.99 ***	7.74 ***	6.11 ***
		(1.54)	(1.14)	(1.27)	(0.68)	(1.47)	(1.14)
8	Same Country	22.24 ***	-5.11	8.57 ***	-7.78 *	6.48	-4.10
		(5.73)	(3.62)	(3.10)	(4.50)	(7.08)	(3.84)
	Borrower Country Specific (except [a])						
9	Creditor Rights	-4.74 **	-0.38	0.01	0.81	-2.02	-0.45
		(2.31)	(1.09)	(1.28)	(0.97)	(2.06)	(0.99)
10	Creditor Rights missing	-12.49	4.00	5.52	-4.63	-4.57	2.16
		(11.20)	(5.41)	(8.84)	(4.64)	(11.36)	(5.15)
11	Log (GDP)	-7.35 ***	-4.19 ***	-5.17 ***	-5.10 ***	0.52	-4.73 ***
		(2.23)	(0.76)	(1.00)	(0.93)	(2.22)	(0.69)
12	GDP growth	-1.53	1.87 ***	1.47 **	0.76	0.11	1.63
		(1.16)	(0.51)	(0.62)	(0.53)	(0.65)	***(0.55)
13	Sovereign Credit Risk	-0.40	-3.42 ***	-1.35 **	-3.72 ***	1.03	-3.36 ***
		(0.93)	(0.73)	(0.53)	(0.55)	(1.03)	(0.70)
14	Lender Country Fin. Develop. [a]	23.88 *	2.74	-6.09	20.23 ***	16.44	2.90
		(12.55)	(3.94)	(20.73)	(6.51)	(12.67)	(4.10)
Observations		2,186	39,578	17,180	23,403	3,520	38,306
R-squared		0.24	0.36	0.37	0.39	0.22	0.36

[+] Significance levels: *** 1%, ** 5%; * 10%

We extend our analysis of the influence of institutional factors at the lender country-level by including interaction terms between them and bank regulations variables in the regressions. There were no significant results for loan *Spread*, while loan *Maturity* appears affected by these interactions. It suggests that maybe loan *Spread* has lower sensibility to this kind of interactions, when compared to loan *Maturity*. Alternatively, it is the case that loan *Spread* is well explained by the basic determinants of Tables 3.5 and 3.6, with no room for interactions between bank regulations and other lender country factors. Table 3.9 reports the significant results for loan *Maturity*. In principle, *Rule of Law* is not significant to help explaining loan *Maturity* (results unreported). However, regression *R1* in Table 3.9 shows that *Rule of Law* interacts with *Capital* regulations stringency to influence loan *Maturity*. Similarly to results in Table 3.5, we found a direct U-shaped relationship between *Capital* and *Maturity*. The interaction term between *Capital* and *Rule of Law* is positive. Accordingly, at low levels of *Capital* stringency, for which *Maturity* decreases with *Capital*, the interaction produces an opposite effect, which means that *Rule of Law* interacts with *Capital* to alleviate the decrease in *Maturity*. For high levels of *Capital* stringency, at which *Maturity* increases with *Capital*, the interaction is in the same direction, which means that increasing both *Rule of Law* and *Capital* has a stronger impact in increasing loan *Maturity*. Therefore, *Rule of Law* has the unambiguous marginal effect of risk reduction, through its combination with Capital stringency to increase the *Maturity* of loan contracts. Figure 3.1 illustrates, for three different levels of *Rule of Law*, the joint effect of *Capital* and *Rule of Law* on loan *Maturity*[12] according to regression *R2*. It is clear from Figure 3.1 that stricter capital regulations are more effective in increasing the

[12] The lines plotted in Figure 1 correspond to the joint effect of *Capital* and *Rule of Law* on *Maturity*. The dependent variable in regression *R2* in Table 9 is the logarithm of loan maturity. Hence, the function plotted is a factor that, after multiplied by other factor including the remaining explanatory variables, equals loan maturity.

maturity of loan contracts when the country's legal system is more enforceable. Moreover, more stringent capital regulations in countries with poor rule of law experience a stronger decreasing impact on loan maturities, when compared to countries with higher rule of law. Together, the evidence from Tables 3.7, 3.8 and 3.9 shows that capital regulations are more effective in reducing the risk of lending when legal systems are more developed.

Competition interacts with *Capital* stringency to positively influence loan *Maturity*, according to regression *R2* in Table 3.9. At low levels of *Capital*, where *Maturity* decreases with *Capital*, the interaction term has the opposite effect on *Maturity*. Similarly to *Rule of Law*, *Competition* has an unambiguous marginal effect of decreasing risk of loan contracts, through its joint impact, with *Capital* stringency, of increasing loan *Maturity*. Figure 3.2 illustrates, for three different levels of *Competition*, the joint effect of *Capital* and *Competition* on loan *Maturity* found in regression *R4* of Table 3.9. Together with the previous evidence of Tables 3.7 and 3.8, this finding supports the idea that more stringent capital regulations are more effective in reducing risk characteristics of loan contracts when bank industries are more competitive. Despite the negative coefficient of *Competition* alone, it is clear from Figure 3.2 that the positive interaction between it and *Capital* offsets that negative influence on *Maturity* when *Competition* is above median and *Capital* stringency level is greater than 4.

Our last piece of evidence concerns the interaction of *Private Monitoring* with *Rule of Law* and *Competition*. Regressions *R3 and R4* in Table 3.9 show positive coefficients for the interaction terms between these variables. Given that *Private Monitoring* has a negative coefficient, the effect of interactions is to counterbalance the decreasing impact of *Private Monitoring* on loan *Maturity*. Precisely, *Private Monitoring* linearly reduces loan *Maturity*, but this effect is more important when the

levels of either *Rule of Law* or *Competition* are low. Figures 3.3 and 3.4 illustrate the models of, respectively, regressions *R3* and *R4.* Due to negative coefficients of both *Private Monitoring* and *Rule of Law*, the combination of low *Rule of Law* and *Private Monitoring* up to a level of 10 produces the longest maturities. However, Figure 3.3 shows that the interaction term is able to make increasing the relationship between *Private Monitoring* and loan *Maturity* when *Rule of Law* is above its mean. On the other hand, due to a lower negative impact of *Competition* alone on *Maturity (R4)*, when compared to the impact of *Rule of Law* alone (*R3*), only the combination of low *Private Monitoring* and low *Competition* produces the longest maturities. Figure 3.4 shows that, for levels of *Competition* above its median, the positive effect of the interaction on loan *Maturity* more than offsets the negative individual impacts of both *Private Monitoring* and *Competition* on *Maturity*, resulting in an increasing relationship between *Private Monitoring* and loan *Maturity*. The evidence adds to that obtained in Table 3.6, and reinforces that, although external private monitoring on banks solely increases the risk characteristics of loan contracts, its interaction with either *Capital* stringency, *Rule of Law,* or *Competition,* highlights its importance as a complementary mechanism in the reduction of lending risk.

Regression *R5* in Table 3.9 shows that all previous interaction effects treated in regressions *R1 to R4* are still present when they are simultaneously included in the same model. Finally, we conclude for the evidence of a complementary role of both bank competition and legal enforcement to bank regulations in achieving the reduction of priced risk characteristics of loan contracts.

Table 3.9 –Effects on Loan Maturity of Interactions between Bank Regulations, Rule of Law, and Competition

Dependent variable: Log of Maturity. OLS regressions over the period 1998-2006. Robust standard errors clustered by banks are in parentheses. Constant, year dummies and other loan-specific controls (industry sector, loan purpose and loan type) are omitted. Coefficients and standard errors are multiplied by 100. Significance levels: *** 1%, ** 5%; * 10%.

	Explanatory Variables	*R1*	*R2*	*R3*	*R4*	*R5*
	Lender Country Specific					
1	Capital	-15.22 ***	-21.36 ***	-7.38 **	-15.28 ***	-27.23 ***
		(4.76)	(5.45)	(3.71)	(4.04)	(6.20)
2	Capital^2	0.85 ***	1.14 ***	0.89 ***	1.47 ***	1.14 ***
		(0.32)	(0.29)	(0.32)	(0.32)	(0.29)
3	Official	-2.04 ***	-2.19 ***	-1.44 **	-1.79 ***	-2.00 ***
		(0.56)	(0.59)	(0.62)	(0.52)	(0.57)
4	Private Monitoring	0.71	0.15	-7.01 **	-7.80 **	-15.08 ***
		(0.90)	(0.88)	(3.49)	(3.24)	(3.99)
5	Rule of Law	-43.01 ***		-47.06 **		-90.61 ***
		(9.89)		(20.39)		(21.06)
6	Competition		-8.32 **		-8.19 *	-16.29 ***
			(3.64)		(4.51)	(6.28)
7	Capital x Rule of Law	6.26 ***				4.65 ***
		(1.72)				(1.54)
8	Capital x Competition		1.99 ***			1.84 ***
			(0.65)			(0.66)
9	Priv. Monitoring x Rule of Law			4.80 **		6.01 ***
				(2.29)		(2.00)
10	Priv. Monitoring x Competition				1.39 **	1.07 **
					(0.56)	(0.51)
	Lender, borrower and loan specific					
11	Lender Log (Assets)	-1.57	-4.51 ***	-1.61	-5.16 ***	-4.50 ***
		(1.06)	(1.23)	(1.10)	(1.25)	(1.25)
12	Lender Leverage	-0.88	0.25	-0.93	0.60	0.72
		(0.76)	(0.65)	(0.76)	(0.66)	(0.61)
13	Borrower Rating	2.43 ***	2.33 ***	2.50 ***	2.35 ***	2.33 ***
		(0.48)	(0.44)	(0.49)	(0.45)	(0.43)
14	Log (Deal Amount)	6.30 ***	6.05 ***	6.42 ***	6.15 ***	5.93 ***
		(1.09)	(1.12)	(1.08)	(1.14)	(1.14)
15	Same Country	-1.88	-0.81	-1.89	-0.42	-1.57
		(3.15)	(3.30)	(3.17)	(3.31)	(3.13)
	Borrower Country Specific (except [a])					
16	Creditor Rights	-0.42	0.23	-0.03	0.36	-0.17
		(0.90)	(0.88)	(0.87)	(0.83)	(0.81)
17	Creditor Rights missing	1.41	-0.80	1.79	-0.93	0.02
		(5.06)	(4.77)	(5.07)	(4.70)	(4.95)
18	Log (GDP)	-4.54 ***	-4.75 ***	-4.39 ***	-4.79 ***	-5.18 ***
		(0.76)	(0.74)	(0.77)	(0.75)	(0.72)
19	GDP growth	1.59 ***	1.48 ***	1.60 ***	1.60 ***	1.55 ***
		(0.48)	(0.48)	(0.48)	(0.48)	(0.46)
20	Sovereign Credit Risk	-3.04 ***	-2.72 ***	-2.98 ***	-2.70 ***	-3.13 ***
		(0.57)	(0.61)	(0.57)	(0.62)	(0.58)
21	[a] Lender Country Fin. Develop.	3.65	13.43 ***	5.36	14.09 ***	17.38 ***
		(3.65)	(4.49)	(3.92)	(4.23)	(4.39)
Observations		41,965	41,965	41,965	41,965	41,965
R-squared		0.35	0.35	0.35	0.35	0.35

Figure 3.1 – Effects on Loan Maturity of Interaction between Capital regulations and Rule of Law

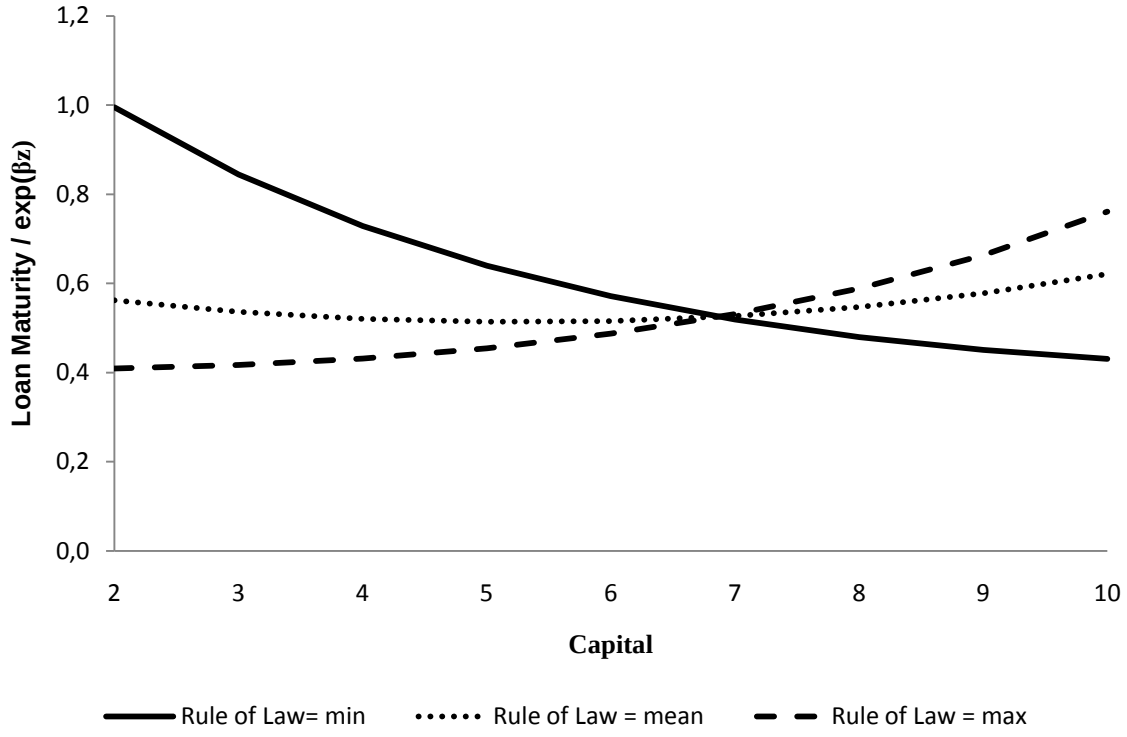


Figure 3.2 – Effects on Loan Maturity of Interaction between Capital regulations and Competition

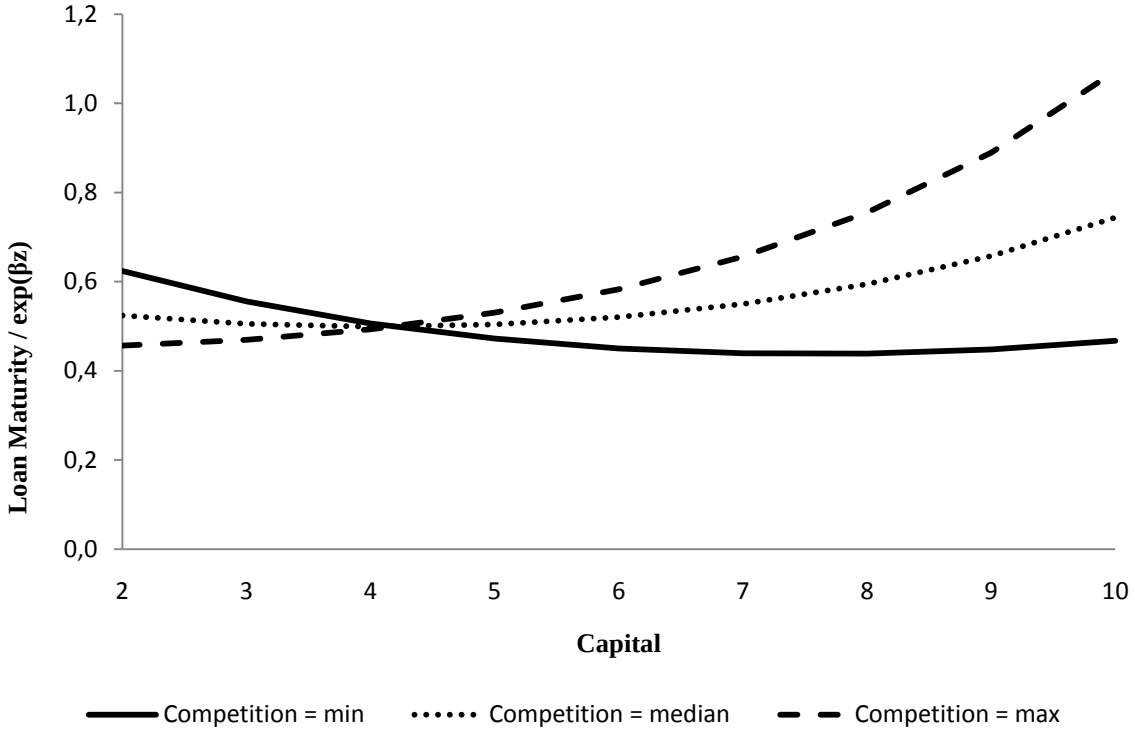


Figure 3.3 – Effects on Maturity of Interaction between Private Monitoring and Rule of Law

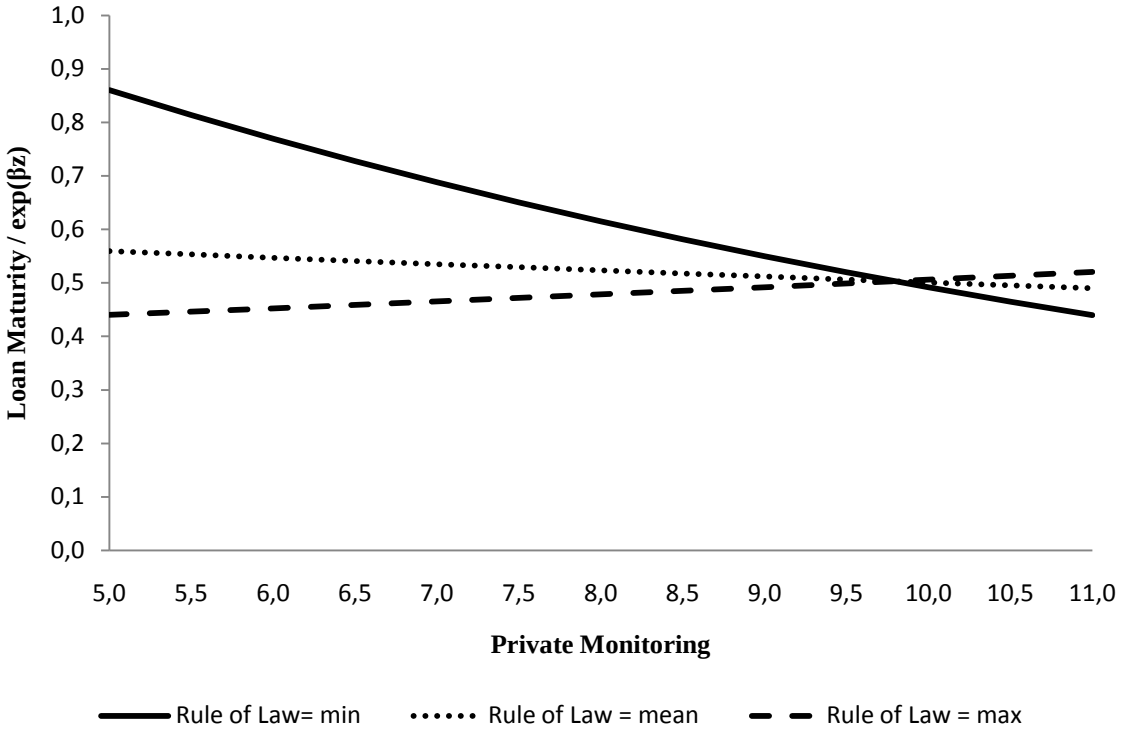
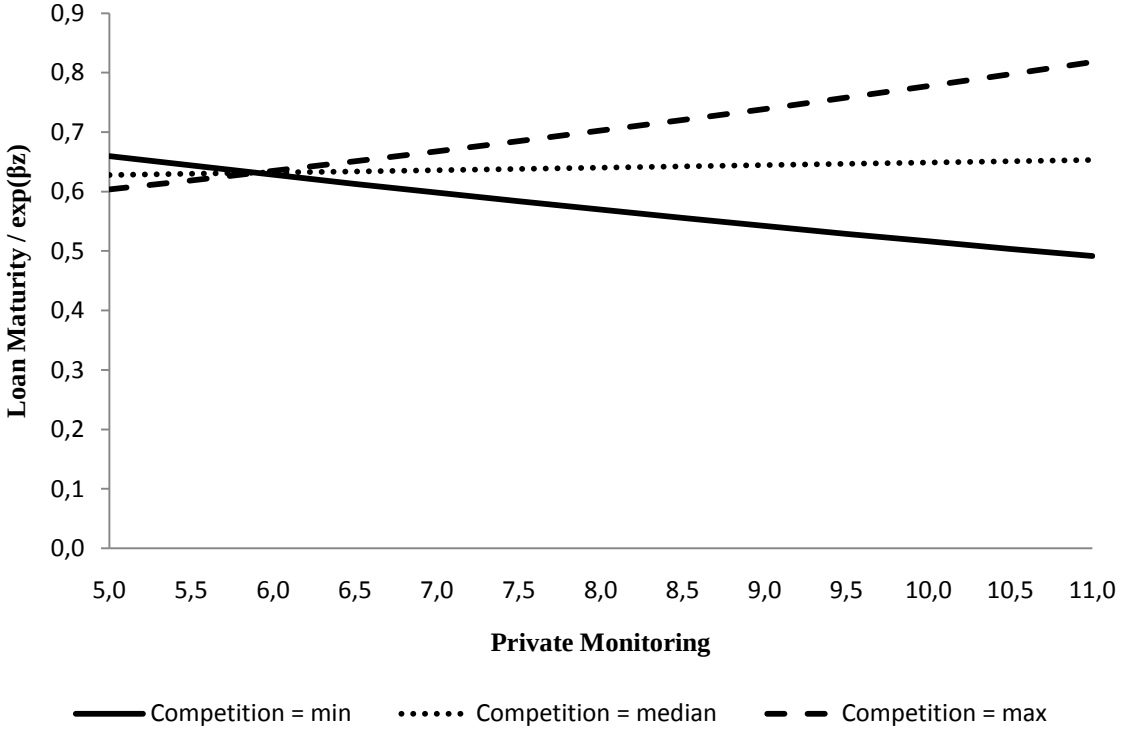


Figure 3.4 – Effects on Maturity of Interaction between Private Monitoring and Competition



3.6 Conclusions

In this chapter we empirically examined the effect that three broad bank regulations implemented by countries exert on banks' credit policies: the level of stringency of capital restrictions imposed to banks, the degree of the power that the official supervisor authority has to oversee and intervene in the functioning of banks, and the degree to which banks are exposed to external private monitoring, apart from official regulatory oversight.

The results indicate that priced risk terms of loan contracts have an inverse U-shaped relationship with capital regulations stringency. Precisely, we found evidence of loan contracts with lower spreads and longer maturities when the stringency of capital regulations is either low or high, while higher spreads and shorter maturities are associated to moderate levels of capital stringency. The decreasing behaviour of loan contracts' risk measures from moderate to high levels of capital stringency favours the view that strengthening capital regulations contains bank risk taking. However, the increasing behaviour of risk measures from low to medium levels of capital stringency opposes that view and supports the argument of a reduction in loan monitoring incentives by banks as a consequence of toughening capital requirements. However, it may be the case that higher risk measures in this region is simply the result of shifting the pressure of slightly stricter capital regulations to loan price terms, rather than the banks' reaction to capital toughening in the form of relaxing credit policies, which would be the case only if capital regulations become significantly stringent. Regarding the role of official supervision, we found that more empowered supervisors contribute to riskier bank lending, through the shortening of loan contracts' maturities. Interestingly, there is evidence of interactions between bank regulations influencing loan contracts risk terms: both official supervisory power and private monitoring behave

either as substitutes or complements to capital stringency to reduce loan contracts risk measures, depending whether capital stringency is respectively low or high. Together, this evidence reveals that, at high levels of capital regulations stringency, loan contracts tend to experience less risk as consequence of both the superior financial soundness of better-capitalized banks and the complementary roles of supervision and market discipline in containing bank risk-taking.

This study provides a valuable piece of evidence on the interactions between bank regulations and other institutional country level factors when influencing bank lending. We found that a country's levels of financial development, enforcement of law, and competition in the banking industry, are mechanisms that enable the effectiveness of capital regulations in reducing loan contracts risk terms. Finally, we found that although external private monitoring on banks alone increases the risk characteristics of loan contracts, its interaction with both capital regulations stringency and banking competition highlights its importance as a complementary mechanism in the reduction of the risk of lending.

The results suggest more complex interactions between bank regulations to influence risk taking behaviour than simply playing complementary roles, as advocated by proponents of reinforcing pillars of Basel II. Loan contracts in countries where capital regulations are more relaxed experience longer maturities, and this is especially true if official supervisory power is also low. Increasing capital stringency up to a moderate level shortens maturity but this effect is counterbalanced if official supervisory power is high, which suggests that official supervision substitutes capital in keeping loan maturities long.

This chapter opens avenues for future research. The analysis presented is cross-sectional, given that we have only three waves of data concerning the regulatory indices

used. If more data become available in the form of another survey of bank regulation and supervision, these can be incorporated to enhance our estimation techniques. A new survey would open the possibility for conducting a longitudinal analysis of how variations in regulatory measures produce changes in the credit policy followed by each individual bank, e.g., through fixed effects estimation. Such longitudinal approach will help tackling endogeneity issues of reverse causality related to the changes in regulation triggered by certain condition in the credit market and issues related to cost adjustments. Finally, issues of simultaneous versus sequential implementation of both capital requirements and supervision regulations will be properly addressed in a longitudinal study.

Chapter Four

Bank Loan Announcements and Market Discipline

4.1 Introduction

It is well established by the research on bank regulation that capital markets may play a role in shaping the risk-taking behaviour of banks. Bank regulatory authorities and committees on bank regulation around the world (e.g. the Basel Committee on Bank Supervision and the US and European Shadow Financial Regulatory Committees) are aware of this issue and recommend the implementation of appropriate mechanisms promoting bank transparency and market discipline on banks. The international financial crisis that started in 2007 has challenged us into rethinking the functioning and regulation of financial and credit markets. At the center of the discussion are the roles that official supervision and market discipline should play in achieving financial stability.

In this context, the purpose of this chapter is to investigate whether and how bank regulations favouring the private monitoring of banks effectively influence

financial markets' responses to bank risk-taking decisions. Specifically, we conduct an empirical analysis that estimates the effect of private monitoring of banks on the cumulative abnormal returns experienced by bank stocks following a loan announcement. Our sample includes 1,354 bank loan announcements made by 119 banks located in 35 countries during the period from 1998 to 2006. Our measure of private monitoring is an index, proposed by Barth *et al*. (2006), that reflects the degree to which banks are exposed to external monitoring, apart from official regulatory and supervisory oversight. It comprises regulatory requirements of information and accounting disclosure, external auditing, depositor protection, use of subordinated debt, and discipline.

The contribution of this chapter is twofold. First, it helps to fill a gap in the literature by providing evidence of market price reactions to loan announcements, using event-study techniques. Second, by relating the bank regulations promoting the private monitoring of banks to the stock market reactions following bank loan announcements, it adds to the empirical research on market discipline of banks by providing evidence of the effectiveness of both recognition and control phases of market discipline, in the context of the two-stage process of market discipline of banks proposed by the frameworks of either Flannery (2001) or Hamalainen *et al*. (2005).

The results show that bank stocks experience significant cumulative abnormal returns (CAR) on the days surrounding bank loan announcements. In addition, we find that positive CAR reactions have higher magnitudes and are more frequent in countries with more private monitoring regulations, while negative CAR reactions have lower magnitudes and are less frequent in countries with high private monitoring. A regression analysis including loan specific, as well as firm and country level controls for lender and borrower characteristics, provides evidence of an inverse U-shaped relationship

between the private monitoring measure and the cumulative abnormal returns. The evidence suggests that markets, on average, react positively to loan announcements in environments where private monitoring is encouraged by the regulator. We interpret this as evidence of the disciplining role of market monitoring on banks' decisions. Moreover, the evidence of decreasing CAR at very high levels of private monitoring highlights the difficulties of reaching the Basel Committee's recommendation of an appropriate balance between the level of bank transparency and meaningful disclosure capable to foster effective market discipline, and the level of protection of bank proprietary information that guarantees the provision of added-value services by banks. Additionally, we find evidence suggesting that private monitoring is more important as a mechanism of rewarding sound bank risk-taking practices through positive cumulative abnormal returns reactions in countries with less developed stock markets and legal systems. Finally, we find the same relationship between private monitoring and cumulative abnormal returns in countries with higher official supervisory power, suggesting these regulatory mechanisms are complements when influencing bank stock market reactions.

The remainder of the chapter is as follows: Section 4.2 makes a review of both theoretical and empirical related literature. Section 4.3 details the dataset used in the analysis. The methodology and results are described in Section 4.4. Finally, Section 4.5 contains the conclusions of this study.

4.2 Related Literature

This section provides a literature review on the role of market discipline on banks' behaviour. The risk of systemic banking crises or financial instability resulting

from bank failures, and the inability of depositors to monitor banks often justify the regulation of banks (Santos, 2001). Although the introduction of a lender of last resort and deposit insurance schemes minimizes the costs of bank failures, it creates a moral hazard problem on the part of banks. To overcome such problem, bank capital regulations are introduced, in order to influence bank risk-taking. On top of that, the official supervision of banks is adopted to complement capital regulations in shaping bank risk-taking behaviour. However, this arrangement is argued to have generated substantial social costs (Flannery, 2001). For example, Dermiguç-Kunt and Detragiache (2000) blame, to a large extent, the inadequate government supervision for the financial crises suffered by 40 out of 61 studied countries between 1980 and 1997.

4.2.1 Motivations for the market discipline of banks

The inherent difficulties experienced by governments to implement efficient supervisory systems, worsened by the increasing complexity of banking organizations, motivate the reliance of governments on market discipline as a complementary supervisory mechanism. This reliance is supported by evidence that investors have the ability to assess banks' conditions very well[13]. Indeed, proposals from the United States and European Shadow Financial Regulatory Committees, as well as the adoption of market discipline as one of the three pillars of the New Basel Capital Adequacy Framework, or simply Basel II (Basel Committee, 2004) favour the implementation of incentive-compatible regulatory design, by acknowledging the importance of market discipline.

Nevertheless, there is not a consensus on the appropriate degree of reliance that should be placed on market discipline as a bank supervisory mechanism. In fact,

[13] See Gilbert (1990), Berger (1991) and Flannery (1998).

Flannery (2001) remarks that the available empirical work is inconclusive on whether the market does a better or a worse job than the regulator in assessing bank quality[14]. Basically, opinions regarding the role of market discipline differ across the two different approaches to bank regulation thinking, namely, the public interest and the private interest views[15]. Barth *et al.* (2006) notice that, according to the private interest view, greater reliance on market discipline is important to deter the pressure that banks put on politicians, and the influence of these politicians on supervisors and regulators. Also, supervisors may experience mixed incentives to enforce and monitor banks, as a result of not being well compensated or not having their own wealth invested in banks. Taking the private interest perspective, Herring (2004) argues in favour of market discipline, describing it as forward-looking, inherently flexible and adaptive, continuous, impersonal and non-bureaucratic, whereas official supervision usually is rule-based, episodic, bureaucratic, and slow to change. This author advocates that 'one of the principal merits of market discipline is that banks directors and managers are faced with the burden of proving to the market that the bank *is not* taking excessive risks rather than subjecting officials to the burden of proving, in a review process, that the bank *is* taking excessive risks.'

[14] Berger and Davies (1998), Berger et al. (2000) and Hall et al. (2000)

[15]The public interest approach to bank regulation thinking considers that regulation serves to the public interest of improving social welfare, by boosting economic development, preventing systemic crises and protecting depositors. This approach assumes the existence of market failures and that governments have the incentives and capabilities to overcome those failures. By contrast, the private interest approach considers regulation as a product, subject to supply and demand forces. In this view, the private interests of the regulator and bankers prevail over the public interest, when determining bank regulations. It is the case for political and/or regulatory capture, which can lead to venal and systematic corruption. In practice, it is reasonable to view regulations to experience a dynamic process of responding to different incentives along the time, fluctuating between the extreme approaches (Kane, 1997). See Barth *et al.* (2006, chapter 2) for a review on public and private interest approaches to regulation.

The public interest view questions these arguments, expressing concern about placing excessive trust in market monitoring, especially in countries with poorly developed capital markets, accounting standards, and legal systems. It is argued that those countries are better off delegating to official regulators the control of banks' behaviour as greater reliance on private-sector monitoring may lead to exploitation of small savers, resulting in poor bank development. However, Caprio and Honohan (2004) present reasons why low-income countries may be in a better position to exert market discipline. First, in general these countries do not have deposit insurance and, even if they do, fiscal difficulties make it less credible, resulting in incentives to market participants to exercise monitoring on banks. Second, these countries have more foreign banks, which are more transparent and easier to be monitored by the market. Third, banks are less complex in low-income countries, which facilitates monitoring. Fourth, the small size of business and banks also facilitates monitoring. Additionally, those supporting the private interest view argue that it is precisely in countries with weak institutional development where supervisors are more likely to be captured. Barth *et al*. (2006) believe that 'only empirical testing can resolve the debate over which approach to bank regulation better characterizes the regulatory policies countries make'. In this chapter we contribute to this discussion by investigating whether and how different markets react to bank loan announcements, through a cross-country analysis that allows us to control and examine how different institutional settings affect this relationship.

4.2.2 Market discipline framework

It is important to understand the mechanism through which the market can discipline banks. According to Lane (1993), the concept of market discipline refers to '[f]inancial markets providing signals that lead borrowers to behave in a manner

consistent with their solvency'. These signals typically assume the form of cutbacks in sources of funds used to finance a firm's assets. Therefore, applying the concept of market discipline to banking means that suppliers of bank's funds, namely, depositors, debt holders and equity owners, may provide reactions to bank behaviour that induce bank managers to undertake actions that promote solvency.

For the sake of clarity and contextualization of this study in the literature on the market discipline of banks, we rely on Flannery (2001) and Hamalainen *et al.* (2005) to make the distinction between the concepts of "market monitoring" and "market discipline", in the context of banking. According to those authors, market discipline includes two distinct components, or, similarly, consists of a two-stage process. The first component or stage is the "market monitoring" or the "recognition phase". It refers to the situation where 'investors accurately evaluate changes in a firm's condition and incorporate those assessments promptly into security prices' (Flannery, 2001, p. 110). The second component or stage is referred as "market influence" or the "control phase", and consists of 'the process by which outside claimants influence a firm's actions' (Flannery, 2001, p. 110). In Hamalainen *et al.* (2005)'s words, 'true risk *control* depends on whether the borrowers, i.e., banks, react to these signals and behave in a manner consistent with their solvency'. We adhere to this two-stage process of market discipline and seek to make a contribution to the literature by analyzing our results in the light of this framework.

4.2.3 Conditions for effective market discipline

The literature has identified four necessary conditions for market discipline to occur, according to Hamalainen *et al.* (2005). Three conditions are associated to the recognition phase (or market monitoring stage), while the remaining one refers to the

control phase (or market influence stage). Concerning the recognition phase, the first condition is the existence of unrestricted and efficient capital markets, 'so that the market can discriminate between prudent and imprudent credit institutions and, therefore, provide appropriate market signals' (Hamalainen *et al.*, 2005, p. 189).

Second condition to effective market monitoring refers to the public disclosure of bank capital structure and risk exposures. It means that 'investors must be able to obtain relevant information about a borrower's outstanding debts' (Hamalainen *et al.*, 2005, p. 189). It is precisely at this point that bank regulations implemented by regulatory and supervisory agencies to favour the private-sector monitoring of banks may play a role in promoting the market discipline of banks as a complementary mechanism of bank regulation. In this regard, the Basel Committee (1998) argues that the accurate assessment of a bank's financial condition by investors requires sufficient public disclosure of bank information. As argued by Hamalainen *et al*. (2005, p. 190), the benefits of enhanced information transparency are that 'it should allow market discipline to work earlier and more efficiently, thereby strengthening the incentives for banks to behave in a prudent and efficient manner', as well as to work as a signalling mechanism for the sound and well-managed bank to discriminate from bad banks. However, as argued by Bruni and Paterno (1995), a certain amount of informational opaqueness is required for banks to be able to provide added-value services. The Basel Committee (1998) attempts to conciliate these arguments by stating the importance of reaching an appropriate balance between the need for meaningful disclosure that allows effective market discipline, and the protection of bank proprietary information. Inspired by Berger (1991), Hamalainen *et al*. (2005) summarize the second condition to the effective market monitoring as the need of a regime that promotes the disclosure of the *right information* at the *right time*. The *right information* condition implies the

relevance, sufficiency, comparability, reliability and quality of information, whereas disclosing it at the *right time* is important to avoid moral hazard problems that may arise if no external check on the ex ante risk-taking behaviour of banks is performed. Our study is closely related to the second condition to effective market monitoring of banks, as we seek to estimate the relationship between market signals and an index measuring bank regulations that promote the private monitoring of banks.

The third condition to effective market monitoring states that market participants must not believe that the borrower would be bailed out in the case of an actual or impending default (Hamalainen *et al.*, 2005). Here the argument is that market prices and quantities do not react to changes in bank risk if market participants, including banks, investors and depositors, believe that they are protected, explicitly or implicitly, in the event of a bank default. Such belief generates moral hazard on the part of both borrower and lender, undermining market discipline. Being explicitly or implicitly protected is related to the credibility that regulatory authorities enjoy in achieving a 'no bailout policy' (Lane, 1993). In other words, in addition to promising not to bail out, regulatory authorities should create incentives that signal to market participants that the promise is credible. The main forms of bailout are the 'too-big-too-fail' policy and the deposit insurance schemes. Where these mechanisms are present, bank and depositors moral hazard behaviour harms the efficient assessment and pricing of bank condition by investors. However, as argued by Lane (1993), these difficulties can be tackled if the safety net is set at the right level, which means to discriminate the market between the individuals whose protection is socially, politically or ethically desirable, and those individuals who can be in a better position to suffer losses and, given the right incentives, perform a valuable monitoring function. The first group of individuals might include the depositors, while the second group includes the investors, represented by

both debt and equity holders. It is also important to notice that the characteristics of the financial instruments providing signals of bank condition will influence the effectiveness of market discipline. Hamalainen *et al*. (2005) incorporate these issues in their framework by restating the third condition to the effective recognition phase of market discipline as simply the *right participants* condition, making clear it reflects considerations regarding the bailout mechanisms, the 'no bailout policy', the investors' characteristics and incentives to monitor, and the characteristics of the financial instruments.

The condition to effective market discipline associated to the control phase is simply that borrowers (i.e., banks) must respond to market signals produced in the recognition phase. To induce appropriate responses of banks, Hamalainen *et al*. (2005) advocate for the creation of suitable incentive structures, including a strong corporate governance environment, 'that ensure that responsibility for the prudent management of banks lies firmly with bank management'.

4.2.4 Equity prices as signals for market discipline

Regarding the *right participants* condition, recent proposals of implementation of market discipline have focused on the creation of mandatory subordinated debt-holders[16]. However, given that we conduct an empirical study that looks at stock prices reactions, we concentrate on the issues related to other alternative for market participants, namely the shareholders. In principle, shareholders are eligible candidates for inducing market discipline. According to Saunders (2001), under the assumptions of Merton (1974) model on the corporate value of debt, there is no difference between

[16] Hamalainen *et al*. (2005) apply the mandatory subordinated debt-holders solution to their framework, providing a description and justifying the advantages of this kind of proposals.

using bond prices or equity prices in providing information for market discipline purposes. Nevertheless, it is controversial whether shareholders qualify as "right participants" to induce market discipline. The problem lies in that shareholders and regulators experience different incentives to monitor and deter bank risk-taking. On the one hand, as equity typically loses value in the event of bank failure, shareholders are sensitive to bank risk, and consequently may function as reliable monitors of bank condition. On the other hand, Evanoff (1993) argues that equity does not work as a market discipline instrument, as shareholders have an incentive to invest in high risk-taking banks, given the moral hazard associated to their skewed risk-return profile. Moreover, according to Horvitz (1983), it is uncertain whether enhanced bank transparency can mitigate the high risk-taking incentives of shareholders. In conclusion, the arguments favour the reliance on equity holders as right participants to induce market discipline if bank probability of default is low, while high-risk taking incentives at high bank default probabilities may invalidate this reliance. Saunders (2001) discusses the pros and cons of both debt and equity as instruments for the market discipline of banks. The first pro of equity is that its market is much more liquid than the secondary bond market. Second, there are models that successfully predicted corporate and bank failures based on equity prices. Third, there are more bank stocks traded than bonds. And fourth, as banks' managers have increasingly equity linked compensation contracts, it is equity rather than bond prices that drive managerial decisions. Among the cons, the author mentions firstly the incorporation on equity prices of the "too-big-to-fail subsidy", and secondly, the occurrence of overreactions of prices to news. Finally, Saunders (2001) recommends the 'use of equity and equity prices and drop the subordinated debt proposal until the corporate bond market becomes liquid and bond prices are more transparent'. Sundaresan (2001) argues that the higher

quality of stock prices with respect to bond prices may more than compensate the complexity in interpreting stock prices. Flannery (2001) concludes that the value of stock vs. bond prices as information sources undoubtedly warrants further research.

Therefore, the suitability of equity as a market discipline instrument is justified, despite the mentioned flaws. In addition, we claim that using equity as instrument is more appropriate to our analysis, when compared to subordinated debt. This is because the banks in our sample are located in a heterogeneous set of countries, including developing ones, where debt markets are inexistent or poorly developed. As argued by Karacadag (2001), extending market discipline based on traded debt to emerging countries could be disastrous, even if debt discipline might work well in developed financial markets.

4.2.5 Our scope and contributions

We acknowledge and adhere to the merits of the two-stage framework proposed by either Flannery (2001) or Hamalainen *et al.* (2005). Accordingly, we seek to contextualize our study in that framework, by clarifying that it encompasses both the recognition and the control phases of market discipline. First, our measure of market price reactions to loan announcements represents investors' reactions to a perceived change in bank risk taking that work as a signal to bank managers, which characterizes the recognition phase. Second, we claim that the observed market reactions incorporate the control phase, in the sense that they reflect an equilibrium situation where banks' behaviour depends on bank managers' beliefs about the market reaction to a particular action, in the presence of bank regulations promoting the private monitoring of banks, as well as of the necessary conditions for the effective implementation of market discipline. In this sense, although our setting does not allow us to observe bank

managers' actions taken to directly influence banks' behaviour, we argue that, as conditions for the effective recognition phase of market discipline (efficient capital markets, right information at the right time, and right participants) become more developed, the observed market signals more likely reflect bank managers' actions. The rationale behind this mechanism is that the pressure that bank managers experience to behave properly increases with the efficiency of capital markets and the quality of monitoring exerted by the market on banks.

Turning to the research on market reactions to bank loan announcements, we observe that it has been restricted to the measurement of borrower stock abnormal returns (e.g. James, 1987). There is no study focusing on the abnormal returns experienced by the lender's stock, as a reaction to the announcement of a loan to a borrowing firm. There are, however, studies with related purposes, such as those measuring bank stock reactions to events related to bank risk-taking behaviour. In this context, there are some studies in the early 1980s, including Pettway and Sinkey (1980), who showed that abnormal returns on bank stocks can predict bank failure. More recently, Bliss and Flannery (2001) report bank holding companies' equity and bond values variations with respect to changes in bank's asset value. O'Hara and Shaw (1990) measure the private value of a 'too-big-to-fail policy' as an average 1.3 percent abnormal return to the common equity of banks identified as 'too-big-to-fail'. The scarce evidence of bank stock reactions to events related to bank risk-taking attitudes is somewhat surprising, given the existing literature on the potential role of equity prices as a source of signals to effective market discipline of banks. This empirical study intends to make a contribution in filling this research gap, besides investigating the relationship between regulations promoting market monitoring and bank stock price reactions.

4.3 Data description

We constructed a sample of loans made by large banks to large firms located in different countries, in the period from 1998 to 2006. The source of information on individual loans is the LPC Reuters *DealScan* database, which provides detailed data on loan contracts signed all over the world between banks and mainly large firms. Information include lender and borrower identities, dates of origination, purpose of loan, deal amounts, number of lenders, lender deal share, spreads, loan maturity, covenants, and borrower sector and ratings. The focus of our study is to analyze how different country level regulations of external private monitoring on banks are related to bank loan announcements. Therefore, the sample includes loans made in a set of different countries, to ensure heterogeneity of the private monitoring measure across observations. Whenever possible, we collected information on loans made by the 15 largest commercial banks or banking holding companies, in terms of total assets, of the 49 countries considered in the study of La Porta *et al*. (1998), for the period from 1998 to 2006. The selection of such period was motivated by the availability of the bank regulations data, which consist of surveys made by the World Bank in the years 2000, 2003 and 2007 (Barth *et al.*, 2001, 2006, 2008). We assume that country bank regulations reported by those surveys are in place for the following 3-year periods: 1998 to 2000, 2001 to 2003 and 2004 to 2006. Hence, yearly bank regulations variables representing each country's level of private monitoring, capital requirements stringency and official supervisory power are added to the database.

With regard to the variable measuring the degree of private monitoring of banks, which is the focus of this study, it is an index proposed by Barth *et al*. (2006), basically given by the sum of affirmative answers that a country's bank regulatory and

supervisory authority provides to questions proposed in the surveys conducted by the World Bank concerning the existence of the following mechanisms affecting banks[17,18]: external auditing, credit rating by external agencies, (absence of) deposit insurance, accounting recognition of loans accrued unpaid interest/principal, consolidation of accounting, legal liability of directors in case of erroneous or misleading information disclosure, use of subordinated debt as regulatory capital, disclosure of risk management procedures and off-balance sheet items, publicity of formal enforcement actions.

Other country-level variables are included, namely, the borrower country's sovereign debt rating, the level of legal protection of creditors in borrower country, and lender country-level variables such as concentration in the bank industry, number of commercial banks in the country, and proxies for financial development, stock market development, economic development, economy size, and business cycle. Finally, bank-

[17] Precisely, the questions considered in Barth et al. (2006)'s index of private monitoring are: (1) Is an external audit a compulsory obligation for banks? (2) Are auditors licensed or certified? (3) How many of the top ten banks (in terms of total domestic assets) are rated by international credit rating agencies (e.g., Moody's, Standard and Poor)? (4) How many of the top ten banks (in terms of total domestic assets) are rated by domestic credit rating agencies? (5) Is there an explicit deposit insurance protection system? (6) If answer to previous question is 'yes', were insured depositors wholly compensated (to the extent of legal protection) the last time a bank failed? (7) Does accrued, though unpaid, interest/principal enter the income statement while the loan is still non-performing? (8) Are financial institutions required to produce consolidated accounts covering all bank and any non-bank financial subsidiaries (including affiliates of common holding companies)? (9) Are bank directors legally liable if information disclosed is erroneous or misleading? (10) Is subordinated debt allowable as part of regulatory capital? (11) Is subordinated debt required as part of regulatory capital? (12) Are off-balance sheet items disclosed to the public? (13) Must banks disclose their risk management procedures to the public? (14) Are bank regulators/supervisors required to make public formal enforcement actions, which include cease and desist orders and written agreements between a bank regulatory/supervisory body and a banking organization?

[18] Each 'yes' answer to questions (1), (2), (7), (8), (9), (12), (13) and (14) above adds one point to the index. Each'10' answer to questions (3) and (4) adds one point to the index. If answers to questions (5) and (6) are both 'no', one point is added to the index. If answer to questions (10) or (11) is 'yes', one point is added to the index.

level characteristics are collected from the *Bankscope* database, and hand-matched with the previous loan deal level information.

The variable we use to measure the reactions of bank stock prices to loan announcements is the Cumulative Abnormal Returns (CAR), calculated in different event windows of days surrounding the announcement. To compute the CAR, we first gathered information on both bank stock prices and country stock market indices for a pre-estimation period, for each event of a loan announcement. This procedure eliminates from the original sample the loans of banks which stocks are not publicly traded. The source of data on stock prices and market indices is the *Bloomberg* database. Then we computed returns on bank stocks and market indices, which are necessary to estimate the market model of returns on bank stocks. Returns considered as outliers are excluded from the respective time series of bank stock returns. Following standard recommendations of event-study techniques (e.g. McWilliams and Siegel, 1997), we tackled the problem of confounding events in two ways: first, the returns computed are net of the impact of events of dividend payments; second, we excluded from our sample all loan announcements made by the same bank in a time interval shorter than 10 days from the previous or the next loan announcement. This procedure eliminates a very large number of loans, and in some cases, all the loans extended by a very large bank, because some of these banks extend a huge number of loans in almost a daily basis. CAR is simply the returns in excess of the ones predicted by the market model, accumulated on the days included in the event window surrounding the loan announcement. The CAR computed for different event windows are then added to the database of loans, to be used as dependent variables in the estimation of models that explain the influence of bank regulations and other country, lender, borrower and loan specific characteristics on bank stock price reactions to loan announcements.

Most loan deals are syndicated loans, which are loans of large amounts extended by a group of banks. A syndicated loan is leaded by one or few arranger banks and includes some participant banks. The arranger bank is the lender that effectively interacts with the borrower, and its reputation and/or lending relationship with the borrower is relevant to determine loan contract characteristics. The role of participant banks in a syndicated loan is limited to simply compose the loan amount. Therefore, we believe that reactions of investors to a syndicated loan announcement are likely to affect mainly arranger banks' stocks.

After dropping the events of loan announcements for which there are not enough observations to estimate the market model of returns and, in the case of syndicated loans, keeping only the loans in which the underlying bank is an arranger[19] of the loan, we ended up with a sample composed of 1,354 events of loan announcements arranged by 119 different banks located in 35 countries.

We grouped the explanatory variables included in the regression models of CAR in five different sets: lender country specific, borrower country specific, lender specific, borrower specific and loan specific. A detailed description of each variable is provided in Appendix C. Additionally, we included indicator variables for each year in the models.

Table 4.1 contains descriptive statistics of the variables described in Appendix C. We notice the high variances of the dependent variables (CAR in three different event windows). Regarding lender and borrower country specific variables, none of them seem to have a problem of low heterogeneity, which results from the fact that the

[19] We follow S&P (2006) and consider a lender as an arranger if the lender role informed by *DealScan* is one of the following: Arranger, Administrative Agent, Lead Manager, Agent, Lead Arranger, Bookrunner and Lead Bank. We also included the following lender roles as arranger: Co-arranger, Co-lead Arranger, Coordinating Arranger, Joint Arranger, Mandated Arranger, Senior Arranger and Senior Co-arranger.

35 countries in the sample is a subset of the heterogeneous set of La Porta *et. al* (1998). Table 4.2 presents the mean of some lender country specific variables across countries and confirms the heterogeneity of these variables. Concerning lender specific variables, we notice from Table 4.1 that bank leverage is very high (mean of 0.94), and has low heterogeneity (standard deviation of 0.03), which is typical in banking industry. Turning to borrower specific variables, we observe that the borrower has not *Debt_Rating* in 90% of the events, which may represent a problem of low heterogeneity. Borrower and lender arranger are in the same country in 61% of loan announcements. Finally, with the exception of the *Spread* variable, which is missing in 34% of the observations, loan specific variables do not pose any problem to the analysis. We conclude that the heterogeneity of the variables in the sample is enough to allow the conduction of an econometric analysis.

Table 4.1 – Descriptive Statistics
(sample of loan announcements made by arranger banks, from 1998 to 2006)

Variable	*Obs*	*Mean*	*Median*	*Std. Dev.*	*Min.*	*Max.*
Dependent variables:						
CAR_i[-5,+5] days (bp)	1,354	-1.45	2.36	519.59	-3,244	4,592
CAR_i[-3,+3] days (bp)	1,354	-12.57	-8.58	437.92	-3,067	3,190
CAR_i[-2,+2] days (bp)	1,354	2.50	-2.72	404.90	-2,784	3,141
Lender country specific:						
Private Monitoring	1,314	8.25	8.00	1.27	5	11
Capital Stringency	1,314	5.86	6.00	1.94	2	10
Official Supervision	1,350	9.94	10.50	2.37	4	15.5
Financial Development [a]	1,354	0.94	0.94	0.39	0	2.01
Stock Mkt Capitalization	1,354	1.07	0.81	0.87	0.09	4.22
Rule of Law	1,354	1.23	1.42	0.65	-1.65	2.04
Bank Concentration	1,346	0.63	0.62	0.21	0.21	1.00
Log (Number of Banks)	1,354	4.60	4.25	1.35	2.56	9.26
Log (GDP)	1,354	6.03	5.90	1.09	4.07	9.43
Log (GDP per capita)	1,354	9.73	10.11	1.11	6.06	11.20
GDP Growth	1,354	3.60	3.32	2.75	-13.13	21.18
Borrower country specific:						
Sovereign Credit Risk	1,302	4.52	3	3.94	1	18
Creditor Rights [a]	1,354	2.13	2	1.33	0	4
Creditor Rights Missing	1,354	0.07	0	0.26	0	1
Lender specific:						
Log (Assets)	1,354	18.29	18.43	1.31	14.17	20.82
Leverage	1,354	0.94	0.94	0.03	0.82	1.25
Loan Loss Res./Gross Loans	1,231	3.11	1.82	3.72	0	40.74
Borrower specific:						
Debt Rating [a]	1,354	0.44	0	1.39	0	6
Same country as lender	1,354	0.61	1	0.49	0	1
Loan specific:						
Log (Loan Amount)	1,353	18.56	18.55	1.34	13.21	23.12
Log (Lender Amount/ Total Assets)	1,353	-5.35	-4.91	3.03	-14.16	2.16
Spread (bp)	891	166.70	120.00	155.65	-10.50	1,050
Log of Maturity (months)	1,233	3.83	4.09	0.80	0	5.99
Secured [a]	1,354	0.21	0	0.41	0	1

[a] Zero if originally missing.

Table 4.2 – Lender Country Descriptive Statistics
(Mean of country-specific variables for the 1998-2006 period)

	Country	*Private Monit.*	*Fin. Devel.*	*Stock Mkt Cap*	*Bank Conc.*	*Numb of banks*	*GDP (bn USD)*	*GDP per capita*	*GDP growth*
1	Argentina	8.3	0.17	0.49	0.39	88	212	5,685	2.21
2	Australia	9.7	0.90	1.06	0.76	52	509	25,657	3.51
3	Austria	6.0	1.03	0.22	0.68	921	245	30,154	2.31
4	Belgium	7.0	0.75	0.72	0.83	112	297	28,563	2.21
5	Brazil	8.7	0.29	0.38	0.43	181	701	3,960	2.48
6	Canada	8.3	1.04	1.04	0.54	63	859	27,261	3.37
7	Chile	7.3	0.61	0.91	0.51	28	89	5,652	3.63
8	Denmark	8.3	1.19	0.59	0.78	181	204	37,987	2.05
9	France	6.3	0.86	0.81	0.55	366	1,703	28,375	2.32
10	Germany	7.7	1.14	0.50	0.67	1,999	2,341	28,418	1.41
11	Greece	7.3	0.54	0.60	0.86	27	180	16,297	4.14
12	Hong Kong	8.5	1.52	3.36	0.61	164	169	25,067	3.60
13	India	7.0	0.25	0.24	0.55	96	576	550	6.73
14	Indonesia	8.5	0.30	0.40	0.34	148	214	1,000	2.46
15	Ireland	8.7	1.12	0.63	0.57	53	141	35,513	6.77
16	Israel	9.7	0.80	0.62	0.74	22	120	18,286	3.66
17	Italy	7.3	0.76	0.48	0.51	845	1,416	24,620	1.46
18	Japan	9.0	0.72	1.14	0.87	248	4,303	33,817	1.07
19	Korea (South)	10.0	0.81	0.54	0.44	20	589	12,377	4.34
20	Malaysia	9.0	1.22	1.40	0.43	29	108	4,369	4.10
21	Nigeria	7.0	0.12	0.12	0.40	77	70	540	7.82
22	Norway	7.5	0.71	0.44	0.92	15	219	47,957	2.40
23	Pakistan	8.5	0.24	0.18	0.54	38	87	603	4.72
24	Philippines	8.3	0.34	0.44	0.71	45	83	1,037	4.07
25	Portugal	7.0	1.27	0.43	0.79	59	146	14,054	2.04
26	Singapore	9.0	1.03	1.84	0.91	125	99	23,870	5.07
27	South Africa	9.0	0.65	1.73	0.87	51	168	3,672	3.53
28	Spain	8.3	1.06	0.76	0.74	286	822	19,594	3.83
29	Sweden	6.7	0.77	1.13	0.95	25	296	32,974	3.30
30	Switzerland	7.7	1.58	2.50	0.86	370	308	42,682	1.90
31	Taiwan	8.3	-	1.13	0.27	40	316	14,059	4.14
32	Thailand	8.0	1.10	0.48	0.48	26	143	2,244	3.25
33	Turkey	7.0	0.15	0.25	0.67	55	323	4,974	4.10
34	United Kingdom	9.7	1.33	1.49	0.56	394	1,782	29,939	2.82
35	USA	9.3	0.52	1.40	0.25	8,697	10,745	37,232	2.97
	Mean	8.11	0.79	0.87	0.63	456	874	19,115	3.42
	Std Deviation	1.02	0.40	0.69	0.20	1,482	1,914	14,112	1.51

Table 4.3 shows the correlations between the main variables used in the analysis. Regarding the correlation between the dependent variables and bank regulations, the only significant correlation found is a low and positive correlation of 7% between *Private_Monitoring* and the CAR of the [-5;+5] event window. CAR_i[-5;+5] is also positively and low correlated with *Financial_Development*, *Log(Number_of_Banks)*, *Log(GDP)* and *Log(GDP_per_capita)*. CAR in the three event windows are negatively and low correlated with the *GDP_Growth* variable. As *GDP_Growth* is higher in less developed countries, i.e., where *Log(GDP_per_capita)* is lower, it suggests that in these

countries stock market reacts negatively to a loan announcement. The correlations between CAR and the remaining of variables are not significant. As expected, the correlations between the different bank regulations are positive and significant. In particular, the correlation between *Private_Monitoring* and *Official_Supervision* is 44%. Table 4.3 also shows many high correlations, especially between country and lender specific variables. Regarding lender country variables, *Financial_Development* has correlations with *Stock_Market_Capitalization*, *Rule_of_Law* and *Log(GDP per capita)* above 35%. We expect a high correlation between a country's levels of economic and legal development. In fact, the correlation between *Rule_of_Law* and *Log(GDP per capita)* is 83%. Concerning lender specific variables, we observe that the size of banks, measured by *Log(Total Assets)*, has correlations above 50% with some lender country specific variables, namely, *Rule_of_Law, Log(GDP)* and *Log(GDP per capita).*

Table 4.3 – Correlation Matrix (Sample of 1,354 loan announcements made by 119 banks located in 35 countries during the period 1998-2006)

	CAR -5,+5	CAR -3,+3	CAR -2,+2	Priv. Mon.	Cap. Str.	Off. Sup.	Fin. Dev.	Stock Cap.	Rule Law	Bank Conc	Num. Bank	Log GDP	GDP cap	GDP Grow	Sov. CR	Cred. Right	Log Asset	Lev	LLR/ Loan	Debt Rat	Log Am/As
CAR_i[-5,+5]	1																				
CAR_i[-3,+3]	0.79*	1																			
CAR_i[-2,+2]	0.70*	0.86*	1																		
Private Monitoring	0.07*	0.03	0.04	1																	
Capital Stringency	0.03	-0.02	-0.04	0.14*	1																
Official Supervision	0.02	-0.02	0.01	0.44*	0.28*	1															
Financial Development	0.07*	-0.01	0.01	0.10*	-0.14*	-0.03	1														
Stock Mkt Capitaliz.	0.04	0.02	-0.01	0.16*	-0.01	0.17*	0.41*	1													
Rule of Law	0.03	-0.01	0.01	0.03	-0.13*	-0.19*	0.35*	0.20*	1												
Bank Concentration	-0.01	-0.01	-0.01	-0.13*	0.12*	-0.16*	0.18*	0.11*	0.45*	1											
Log (Number of Banks)	0.06*	0.02	-0.02	-0.05	0.30*	0.08*	0.07*	0.13*	0.13*	-0.25*	1										
Log (GDP)	0.07*	0.04	0.01	0.12*	0.05	-0.08*	-0.09*	-0.22*	0.19*	-0.41*	0.60*	1									
Log (GDP per capita)	0.08*	0.05	0.05	0.11*	-0.14*	-0.12*	0.36*	0.25*	0.83*	0.36*	0.26*	0.28*	1								
GDP Growth	-0.09*	-0.09*	-0.08*	0.04	0.06*	0.05	-0.18*	0.23*	-0.14*	-0.02	-0.18*	-0.23*	-0.22*	1							
Sovereign Credit Risk	-0.06	-0.02	-0.02	-0.14*	0.09*	0.19*	-0.26*	-0.14*	-0.66*	-0.23*	-0.14*	-0.25*	-0.66*	0.11*	1						
Creditor Rights	-0.01	0.01	-0.03	0.04	0.06	0.10*	0.17*	0.33*	-0.20*	-0.06*	-0.09*	-0.30*	-0.20*	0.19*	0.10*	1					
Log (Assets)	0.04	0.03	0.03	-0.03	-0.04	-0.23*	0.03	-0.33*	0.50*	0.11*	0.35*	0.58*	0.51*	-0.19*	-0.39*	-0.30*	1				
Leverage	-0.05	0.01	0.02	-0.24*	-0.2*	-0.24*	-0.09*	-0.41*	0.20*	0.02	-0.09*	0.19*	0.08*	-0.24*	-0.14*	-0.20*	0.42*	1			
Loan Loss Res./Loans	-0.05	-0.02	0.01	-0.14*	0.04	0.03	-0.03	-0.19*	-0.59*	-0.20*	-0.10*	-0.29*	-0.65*	0.01	0.46*	0.22*	-0.35*	-0.03	1		
Borrower Debt Rating	-0.01	0.03	0.02	-0.05	-0.06*	-0.13*	-0.05	-0.07*	0.10*	-0.04*	0.06	0.15*	0.07*	-0.04	-0.04	-0.20*	0.14*	0.08*	-0.06*	1	
Log(Lend. Am. / Assets)	-0.03	-0.03	-0.04	0.11*	-0.00	0.05	0.04	0.25*	-0.15*	-0.00	-0.23*	-0.28*	-0.19*	0.09*	0.06*	0.26*	-0.49*	-0.21*	0.06*	-0.06*	1
Log(Maturity)	-0.05	-0.03	-0.01	-0.11*	0.06*	-0.05	-0.03	-0.09*	-0.03	0.10*	-0.12*	-0.10*	-0.01*	0.04	-0.03	0.04	0.04	0.08*	0.01	-0.10*	-0.01

* Significant (at the 5% level).

4.4 Methodology and Results

Our analysis is developed through the use of two methodological approaches. First, we rely on standard event-study technique following Brown and Warner (1980, 1985) to determine the existence and significance of banks' stock returns reactions to loan announcements. Second, we seek to explain the cumulative abnormal returns (CAR) found in the first approach by performing OLS regressions on a selected set of explanatory variables.

We estimate the following market model using the previously described sample of banks' stock returns:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \ , \qquad (1)$$

where R_{it} is the rate of return on the share price of bank *i* on day *t*, α_i is the intercept term for bank *i*, β_i is a measure of the systematic risk sensitivity of the stock of bank *i*, R_{mt} is the return of the country's market index, and ε_{it} is the error term.

We use the loan deal activation date minus five days as the date of the loan announcement, i.e., the event date[20]. The estimation window is from 180 days prior to the event date to 10 days after it. After estimating the alphas and betas in equation (1) for each event, we compute the abnormal returns considering different event windows.

According to the scope of this study, we want to show that market discipline of banks takes place in our setting, by providing evidence of the occurrence of both

[20] We follow Ongena et al. (2007), who also use a sample of loans from *DealScan* database to conduct an event study. They investigate a representative matched sample of press releases from Lexis/Nexis and find that announcements were made on average 5 to 7 days prior to the loan facility activation date.

recognition and control phases of market discipline. Therefore, the empirical analysis that follows is divided in separate assessments of the occurrence of these phases.

The recognition phase

We start by examining specifically if the recognition phase of market discipline is effective, i.e., whether investors react to loan announcements irrespective of the sign of the reaction. First, we assess the significance of the CAR for each event in the sample. Table 4.4 shows high proportions of events that have significant CAR, which represent preliminary evidence that markets react to bank loan announcements.

Table 4.4 – Cumulative Abnormal Returns (CAR)

Proportion of events (loan announcements) that present significant Cumulative Abnormal Returns (CAR), for different event windows. Sample is composed of 1,354 loan announcements made by 119 banks in 35 countries during the period from 1998 to 2006.

Event window (days)	*% of events with significant CAR*
(-5, +5)	60%
(-3, +3)	73%
(-2, +2)	79%

We proceed computing absolute values of CAR and calculating the significance of the absolute cumulative average abnormal returns (ACAAR) for all events treated as a group. Table 4.5 shows the ACAAR and their significance across event windows and different samples. We notice that the ACAAR are significant when considering the whole sample of 1,354 events. We next split the sample in two sub-samples according to the *Private_Monitoring* variable. First sub-sample includes events that occurred in countries with *Private_Monitoring* lower than the median of 8, whereas second sub-sample includes events that occurred in countries with *Private_Monitoring* greater than

or equal to 8. Results in Table 4.5 show that the magnitudes of ACAAR are greater in the low *Private_Monitoring* sub-sample. In principle, the evidence tells that reactions to loan announcements are greater in countries with less regulations promoting the private monitoring of banks. A breakdown in sub-samples of negative and positive reactions within the sub-samples of low and high *Private_Monitoring* reveals that negative reactions are greater in countries with low *Private_Monitoring*, while positive reactions are greater in countries with high *Private_Monitoring*. Together with the evidence of Table 4.4, we conclude that markets do react to bank loan announcements. Moreover, the recognition phase of market discipline takes place in the form of bank stock holders' reactions to bank risk-taking decisions related to lending activity.

Table 4.5 – Market Reactions to Loan Announcements Measured by the Absolute Cumulative Average Abnormal Returns (ACAAR)

Absolute Cumulative Average Abnormal Returns (ACAAR) in basis points, across samples and different event windows. The sample is composed of 1,354 loan announcements made by 119 arranger banks in 35 countries during the period from 1998 to 2006. Sub-samples include loans made by arranger banks in countries with private monitoring respectively lower than 8, and greater than or equal to 8. Robust standard errors are in parenthesis[+].

Event Window	*Whole Sample*	*Low Private Monitoring*	*High Private Monitoring*	*Low Private Monitoring*		*High Private Monitoring*	
				Negative	*Positive*	*Negative*	*Positive*
(-5,+5)	364.4 *** (10.1)	387.3 *** (19.5)	355.2 *** (11.7)	417.8 *** (30.9)	353.0 *** (22.3)	346.1 *** (15.9)	363.8 *** (17.1)
(-3, +3)	301.3 *** (8.6)	321.6 *** (16.7)	293.1 *** (10.1)	364.5 *** (27.76)	279.8 *** (18.6)	285.0 *** (13.2)	301.8 *** (15.3)
(-2, +2)	264.1 *** (8.3)	271.6 *** (15.6)	261.1 *** (9.9)	284.3 *** (23.1)	258.2 *** (20.7)	249.5 *** (12.2)	272.7 *** (15.6)
Obs	1,354	389	965	206 (53%)	183 (47%)	467 (48%)	498 (52%)

[+] Significance levels: *** 1%, ** 5%; * 10%

The evidence in Table 4.5 suggests a role for the degree of regulations promoting the private monitoring of banks in explaining the reactions of arranger

lenders' stocks following the announcements of loans. We investigate deeply the issue by offering an analysis aimed to explain the abnormal returns we have found. Accordingly, we estimate the following model, which regress the CAR on a comprehensive set of explanatory variables:

$$CAR_i = \alpha + \beta_1 Private\_Monitoring_i + \beta_2 Private\_Monitoring_i^2 + \beta_3 Capital_i + \beta_4 Official_i + \beta_5 LenderCountry_i + \beta_6 BorrowerCountry_i + \beta_7 Lender_i + \beta_8 Borrower_i + \beta_9 Loan_i + \beta_{10} YearDummies_i + \varepsilon_i \quad (2)$$

In equation (2), $Private\_Monitoring_i$ is the lender country index of private monitoring on banks, the focus of this study. A quadratic term of this variable is included to allow for a nonlinear relationship between private monitoring and CAR. $Capital_i$ and $Official_i$ account for lender country bank regulations measuring respectively the stringency of capital requirements and the power of official supervision. $LenderCountry_i$, $BorrowerCountry_i$, $Lender_i$, $Borrower_i$ and $Loan_i$ are vectors of, respectively, lender country, borrower country, lender, borrower and loan specific variables. The variables included in each set are described in Appendix C. The index *i* stands for an event, i.e., a loan announcement. The events in the sample do not occur at the same point in time, as they are distributed along the 1998-2006 period. We pooled all the events to perform a single OLS regression, by simply shifting the date of all events to a single new time origin. Year dummies are included as explanatory variables in the vector $YearDummies_i$ to take into account the economy cycle associated to the time dimension. As most banks contribute to the sample with more than one event, we cluster the error terms ε_i by bank, to take into account that the events produced by the same bank may be not independent. We restricted our sample in two ways: first, to only

those loan announcements where the underlying bank is an arranger of the loan syndicate, and, second, to the events for which the CAR is significant.

Given the focus of this subsection on the recognition phase of market discipline, the model described by equation (2) includes variables that take into account the three conditions for the effectiveness of this phase. Concerning the first condition, the variable *Stock_Market_Development* included in $LenderCountry_i$ vector of explanatory variables is assumed to be a measure of the existence of an efficient capital market. Compliance with second condition, namely, the public disclosure of bank capital structure and risk exposures, is measured by the *Private_Monitoring* variable. With respect to third condition, which refers to the 'no bailout policy', we concentrate on the potential moral hazard behaviour on the part of banks in the presence of a 'too-big-to-fail' policy. Also, we rely on equity holders as the market participants with incentives to perform a monitoring function. We believe that the *Bank_Concentration* variable conveys a measure of a 'too-big-to-fail' policy regarding the bailout of banks that influences bank equity holders' incentives to monitoring.

Table 4.6 presents regression results for the [-2,+2] days event window and different sets of explanatory variables. Specifications *R1*, *R2*, *R4* and *R5* include a reduced set of variables and report R-squared around 3% whereas specifications *R3* and *R6*, which include the full set of variables, report R-squared around 5%. First three regressions show a significant and positive linear effect of the level of *Private_Monitoring* on CAR. Last three regressions, which include the squared value of *Private_Monitoring*, point to a quadratic, inverse U-shaped relationship between $Private\_Monitoring$ and CAR. The estimated coefficients for these regressions indicate that the maximum CAR with respect to $Private\_Monitoring$ occurs at an index of private monitoring around 9. Considering the range of this variable from 5 to 11 and its median

of 8, we conclude that CAR is mainly increasing with respect to private monitoring. Moreover, despite the decreasing effect of high levels of private monitoring (indices of 10 or 11) on CAR, it is the case that the net positive effect is still greater than the one for indices of private monitoring lower than 8. An explanation for the decreasing effect of very high *Private_Monitoring* indices on CAR may be that stock investors interpret that too much transparency in the bank industry makes relationship banking less attractive, resulting in reduced opportunities of banks to profit from lending. Alternatively, excess of transparency may harm banks' reliance on a certain amount of 'information opaqueness' to provide added-value services (Bruni and Paterno, 1995). The evidence also highlights the difficulties of reaching the Basel Committee's recommendation of an appropriate balance between the need for meaningful disclosure to allow for effective market discipline and the protection of bank proprietary information. The magnitude of the positive relationship is important, as the net marginal effect of $Private\_Monitoring$ on CAR (i.e., considering linear and quadratic coefficients) is between 300 and 350 basis points, according to regressions *R4* to *R6*.

Table 4.7 shows similar regressions for the [-5,+5] and [-3,+3] days event windows. Evidence on the linear effect of *Private_Monitoring* on CAR appears only on first regression of [-3,+3] days event window, whereas the inverse U-shaped relationship is robust to all specifications.

Table 4.6 – Determinants of Cumulative Abnormal Returns (CAR) in (-2, +2) window
Dependent variable: CAR (in basis points). Event window of (-2,+2) days. OLS regressions of CAR on country, lender, borrower and loan specific variables. Only arranger banks and significant CAR are included. Robust standard errors clustered by banks are in parenthesis[+].

	Explanat. Variables	*R1*	*R2*	*R3*	*R4*	*R5*	*R6*
	Lender Country Specific						
1	Private monitoring	34.4 **	39.3 **	31.0 *	378.8 ***	328.0 **	398.8 **
		(14.7)	(15.4)	(17.3)	(131.7)	(153.7)	(172.3)
2	Private monitoring^2				-20.4 **	-17.1 *	-21.9 **
					(7.8)	(9.2)	(10.5)
3	Capital Stringency	6.2	-1.0	-1.0	-0.3	-6.2	-8.3
		(9.4)	(9.3)	(11.4)	(9.2)	(9.3)	(11.7)
4	Official Supervision	-4.9	-6.7	-4.9	-3.3	-5.9	-3.6
		(7.2)	(8.2)	(9.3)	(7.2)	(8.2)	(9.2)
5	Financial Development	46.4	10.5	-2.1	34.5	5.4	-6.8
		(51.2)	(55.4)	(51.3)	(51.6)	(56.4)	(50.6)
6	Stock Market Development	21.1	12.2	10.3	13.7	2.3	-3.2
		(19.9)	(25.8)	(32.1)	(21.1)	(27.6)	(34.7)
7	Rule of Law	-114.9 **	-118.8	-138.2 *	-98.9 **	-106.8	-124.1 *
		(50.8)	(71.8)	(75.7)	(49.2)	(70.4)	(73.3)
8	Bank Concentration	6.0	33.6	31.7	39.4	56.7	50.6
		(94.9)	(100.9)	(108.2)	(97.6)	(103.8)	(108.1)
9	Log (Number of Banks)	9.8	16.7	13.3	11.1	17.0	13.7
		(16.3)	(19.9)	(22.8)	(16.9)	(20.2)	(23.0)
10	Log (GDP)	11.2	-0.6	-2.2	16.5	6.2	7.0
		(22.7)	(30.9)	(35.7)	(22.9)	(31.8)	(36.8)
11	Log (GDP per capita)	67.6 **	41.3	57.8	57.5 *	38.0	54.5
		(29.8)	(48.2)	(52.2)	(29.7)	(48.1)	(51.9)
12	GDP growth	-12.8	-16.9	-15.8	-13.8	-17.6	-17.1
		(11.5)	(15.2)	(16.7)	(11.4)	(15.2)	(16.5)
	Borrower Country Specific						
13	Sovereign Credit Risk		-6.4	-8.2		-5.7	-7.5
			(6.6)	(8.5)		(6.4)	(8.2)
14	Creditor Rights		-2.1	-3.8		-0.7	-3.1
			(15.4)	(18.7)		(15.2)	(18.5)
	Lender and Borrower Specific						
15	Log (Assets)		-0.1	13.1		-4.3	10.9
			(26.1)	(36.0)		(26.1)	(35.3)
16	Leverage		-7.3	-9.8		-7.0	-10.2
			(9.2)	(10.3)		(9.1)	(10.3)
17	Loan Loss Reserves		-1.1	3.4		-2.1	2.6
			(5.6)	(7.0)		(5.7)	(7.1)
18	Borrower Rating		7.4	14.4		5.2	12.2
			(12.7)	(12.1)		(12.9)	(12.2)
19	Borrower in Same Country		-48.4	-24.8		-44.3	-20.3
			(45.2)	(49.1)		(44.4)	(48.7)
	Loan Specific						
20	Log (Loan Amount)			5.7			3.7
				(16.9)			(16.9)
21	Log (Lender Amount / Total Assets)			-0.2			2.0
				(9.0)			(8.8)
22	Log (Maturity)			-11.4			-11.4
				(27.5)			(27.3)
23	Secured Loan			-74.8			-78.6
				(113.6)			(113.7)
Other loan specific controls		No	No	Yes	No	No	Yes
Year dummies		Yes	Yes	Yes	Yes	Yes	Yes
Observations		1038	914	832	1038	914	832
R-squared		0.034	0.0294	0.0541	0.0392	0.033	0.0596

[+] Significance levels: *** 1%, ** 5%; * 10%

Table 4.7 – Determinants of Cumulative Abnormal Returns (CAR): (-5, +5) and (-3, +3) windows

Dependent variable: CAR (in basis points). Event windows of (-5,+5) and (-3,+3) days. OLS regressions of CAR on country, lender, borrower and loan specific variables. Only arranger banks and significant CAR are included. Robust standard errors clustered by banks are in parenthesis[+].

Explanatory Variables		*(-5,+5) window*				*(-3,+3) window*			
	Lender Country Specific								
1	Private monitoring	33.2	30.8	413.7 **	490.6 **	33.8 **	28.8	465.9 ***	532.9 ***
		(20.7)	(24.9)	(169.8)	(204.7)	(16.1)	(19.5)	(133.7)	(175.0)
2	Private monitoring^2			-22.5 **	-27.3 **			-25.6 ***	-30.0 ***
				(10.0)	(12.4)			(8.1)	(10.8)
3	Capital Stringency	12.5	2.3	5.1	-7.1	5.7	-0.1	-3.4	-11.4
		(12.6)	(15.6)	(12.7)	(16.3)	(9.1)	(10.3)	(9.4)	(11.1)
4	Official Supervision	-4.0	-7.8	-2.1	-5.7	-9.9	-11.2	-7.9	-9.7
		(9.6)	(12.4)	(9.6)	(12.3)	(7.5)	(9.2)	(7.3)	(9.1)
5	Financial Development	71.0	48.6	63.7	46.4	66.3	-11.0	54.3	-15.9
		(84.8)	(74.9)	(85.6)	(74.9)	(57.0)	(55.2)	(57.2)	(55.5)
6	Stock Market Development	32.8	15.1	24.0	-3.6	21.8	3.1	12.1	-17.3
		(27.3)	(43.0)	(27.9)	(45.2)	(20.9)	(31.0)	(20.8)	(33.3)
7	Rule of Law	-137.1 **	-179.3 *	-121.4 *	-160.9 *	-99.8 *	-135.8 *	-81.9	-122.8
		(68.3)	(97.9)	(66.9)	(94.6)	(55.6)	(78.1)	(53.3)	(74.8)
8	Bank Concentration	13.7	-9.6	53.2	22.5	15.1	59.8	59.8	92.7
		(146.7)	(146.0)	(149.2)	(143.4)	(107.0)	(117.1)	(105.6)	(113.0)
9	Log (Number of Banks)	5.4	13.3	7.3	14.6	9.9	24.2	13.6	27.6
		(21.2)	(28.8)	(21.7)	(29.0)	(16.0)	(21.6)	(15.7)	(21.8)
10	Log (GDP)	33.5	0.3	39.0	12.6	15.8	4.6	21.0	13.6
		(35.3)	(43.5)	(35.1)	(45.0)	(24.9)	(36.0)	(23.0)	(36.0)
11	Log (GDP per capita)	81.0 **	46.0	68.8 *	43.0	39.6	12.5	24.9	9.0
		(39.6)	(70.2)	(40.1)	(69.5)	(33.7)	(52.4)	(33.9)	(52.3)
12	GDP growth	-19.9	-23.0	-21.3	-24.4	-14.4	-10.7	-15.8	-12.1
		(17.0)	(22.1)	(16.9)	(21.8)	(12.2)	(16.7)	(12.0)	(16.4)
	Borrower Country Specific								
13	Sovereign Credit Risk		-10.2		-9.9		-12.9		-12.6
			(13.0)		(12.8)		(10.0)		(9.7)
14	Creditor Rights		-15.1		-12.3		-2.3		0.6
			(25.7)		(25.8)		(20.1)		(20.1)
	Lender and Borrower Specific								
15	Log (Assets)		24.7		19.4		7.4		4.8
			(41.5)		(40.2)		(32.5)		(31.3)
16	Leverage		-13.5		-14.1		-4.1		-4.9
			(14.9)		(14.8)		(10.4)		(10.3)
17	Loan Loss Reserves		-0.7		-1.0		2.4		1.2
			(11.9)		(11.9)		(8.0)		(8.1)
18	Borrower Rating		20.5		18.8		9.1		6.7
			(16.7)		(16.5)		(13.8)		(13.8)
19	Borrower in Same Country		-47.4		-43.3		-40.7		-31.6
			(64.4)		(65.0)		(58.2)		(58.6)
	Loan Specific								
20	Log (Loan Amount)		-2.1		-5.3		6.9		3.8
			(22.3)		(22.2)		(18.3)		(18.6)
21	Log (Lender Amount / Total Assets)		0.6		2.6		0.4		3.0
			(12.5)		(12.3)		(10.6)		(10.4)
22	Log (Maturity)		-20.1		-19.2		-34.3		-36.0
			(44.0)		(43.6)		(31.0)		(30.8)
23	Secured Loan		-42.9		-43.4		-66.4		-76.9
			(141.5)		(142.0)		(122.6)		(123.2)
Other loan specific contr.		No	Yes	No	Yes	No	Yes	No	Yes
Year dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		787	636	787	636	953	753	953	753
R-squared		0.044	0.0718	0.0482	0.0776	0.0309	0.0572	0.0378	0.0659

[+] Significance levels: *** 1%, ** 5%; * 10%

Apart from regulations promoting the private monitoring of banks, we want to assess the importance of the other two necessary conditions for the effectiveness of the recognition phase of market discipline. The first piece of evidence coming from Tables 4.6 and 4.7 does not support a significant influence on CAR of neither the level of the stock market development nor the adherence to a 'no bailout policy', assumed to be inversely related to *Bank_Concentration.* In order to investigate the issue in depth, we performed regressions on sub-samples of low and high values of *Stock_Market_Development* and *Bank_Concentration*, according to their medians[21]. Results in Table 4.8 show that the private monitoring of banks does not matter for CAR reactions in countries with more developed stock markets. It might be that high competition for investors in these markets induces sound bank behaviour, reducing the importance of bank regulations favouring the private monitoring of banks. Conversely, the quadratic relationship between *Private_Monitoring* and CAR is present in countries with low stock market development. The evidence suggests that *Stock_Market_Development* works as a substitute mechanism to *Private_Monitoring*, which implies that these two conditions to the recognition phase of market disciple may not simultaneously hold. Regarding the third condition to the recognition phase, Table 4.8 shows evidence that private monitoring matters for CAR when the bank industry is low concentrated. Recalling that *Bank_Concentration* proxies for the existence of 'too-big-to-fail' institutions, such result may be capturing the situation where low concentrated bank industries enable a role for private monitoring, as we expect these industries comply with the condition of 'no bailout policy' of too-big-to-fail institutions.

[21] For the sake of concision, we report only the results for the [-5,+5] days event window, even though the results hold for the [-3,+3] and [-2,+2] windows as well.

Table 4.8 – Determinants of CAR: Sub-samples

Dependent variable: CAR (in basis points). Event window of (-5,+5) days. OLS regressions of CAR on country, lender, borrower and loan specific variables. Only arranger banks and significant CAR are included. Robust standard errors clustered by banks are in parenthesis[+].

		Stock Mkt Develop.		*Bank Concentration*		*Rule of Law*		*Official Supervision*	
Explanatory Variables		*Low*	*High*	*Low*	*High*	*Low*	*High*	*Low*	*High*
	Lender Country Specific								
1	Private monitoring	802.9 ***	-89.6	467.4 **	269.4	1,046 ***	192.2	731.9	760.6 **
		(300.0)	(452.8)	(256.4)	(316.4)	(377.4)	(320.6)	(477.1)	(336.9)
2	Private monitoring^2	-46.2 **	1.4	-28.4 **	-14.6	-63.2 ***	-6.9	-42.1	-44.8 **
		(19.2)	(24.5)	(15.6)	(19.2)	(21.8)	(19.5)	(30.8)	(19.2)
3	Capital Stringency	-1.6	34.8	-22.6	-7.3	-31.8	19.7	6.1	1.4
		(29.1)	(30.8)	(48.9)	(22.2)	(38.0)	(25.9)	(26.1)	(21.8)
4	Official Supervision	25.2	9.2	17.7	-15.1	-5.1	-24.7	59.9	-9.8
		(29.4)	(19.4)	(23.4)	(13.5)	(31.1)	(17.2)	(45.0)	(36.4)
5	Financial Development	-446.1 **	218.3 *	128.7	90.1	99.2	-134.7	-186.0	236.5 **
		(206.8)	(109.9)	(195.1)	(137.6)	(157.8)	(155.7)	(195.6)	(116.3)
6	Stock Market Development	217.6	46.4	-3.3	-12.6	3.2	44.6	609.3 *	-89.7
		(409.4)	(101.8)	(109.0)	(55.3)	(134.9)	(58.3)	(324.1)	(59.1)
7	Rule of Law	-5.9	90.7	-220.2	-171.5	-248.2	159.0	-254.4	-120.6
		(165.4)	(170.4)	(170.6)	(149.3)	(203.9)	(334.1)	(213.3)	(162.4)
8	Bank Concentration	-568.2 *	168.3	107.1	-269.8	106.6	-61.6	48.9	-246.8
		(334.6)	(344.1)	(620.2)	(331.1)	(405.7)	(275.1)	(479.4)	(213.5)
9	Log (Number of Banks)	-29.6	-35.7	16.5	-14.6	-18.7	65.9	43.3	21.1
		(56.0)	(69.4)	(67.0)	(64.3)	(111.1)	(49.4)	(51.3)	(47.6)
10	Log (GDP)	-36.9	215.6 *	18.6	27.6	105.3	-106.8 *	-30.8	76.9
		(104.5)	(121.6)	(77.7)	(55.2)	(133.2)	(63.4)	(99.2)	(73.1)
11	Log (GDP per capita)	10.9	-265.9	9.7	74.8	62.8	-184.6	142.9	16.4
		(129.0)	(192.8)	(103.8)	(158.1)	(128.5)	(222.1)	(134.5)	(134.7)
12	GDP growth	-70.0 *	5.1	-13.0	-28.8	-20.8	-28.3 *	-69.7 *	30.9
		(35.5)	(30.7)	(33.2)	(26.4)	(34.2)	(14.6)	(40.7)	(31.8)
	Borrower Country Specific								
13	Sovereign Credit Risk	-27.0	-2.9	-3.9	-31.2 **	-12.5	-5.2	2.4	-15.4
		(24.4)	(18.5)	(29.8)	(14.8)	(28.6)	(18.2)	(17.4)	(18.0)
14	Creditor Rights	-47.3	20.9	-78.8	7.4	-17.2	-45.6	26.2	-14.8
		(50.5)	(37.3)	(54.1)	(32.4)	(55.7)	(34.6)	(38.7)	(41.3)
	Lender and Borrower Specific								
15	Log (Assets)	42.5	-27.5	90.5	-15.4	43.9	45.2	-75.9	3.5
		(86.8)	(39.9)	(74.8)	(43.6)	(62.1)	(51.9)	(116.6)	(45.6)
16	Leverage	-16.8	-20.7	-35.8	-34.5	-38.3	12.7	26.5	-13.7
		(28.9)	(20.3)	(28.2)	(22.4)	(30.8)	(20.5)	(31.4)	(23.7)
17	Loan Loss Reserves	-2.5	18.4	-10.2	-13.9	-8.1	-2.4	15.1	2.1
		(21.4)	(31.4)	(21.6)	(28.1)	(19.2)	(24.5)	(23.0)	(29.6)
18	Borrower Rating	-19.7	38.8	55.1	-42.6	-74.9	16.6	-49.3	114.3
		(83.7)	(80.1)	(105.6)	(78.0)	(110.3)	(88.6)	(73.6)	(111.5)
19	Borrower in Same Country	-121.2	-32.2	23.4	-177.2 *	-169.6	12.9	-43.3	-96.2
		(162.3)	(72.1)	(110.9)	(93.0)	(150.4)	(66.0)	(101.8)	(103.6)
	Loan Specific								
20	Log (Loan Amount)	19.0	6.6	-6.1	26.4	-30.7	-11.3	8.5	-28.6
		(43.0)	(30.7)	(35.6)	(30.0)	(48.5)	(30.3)	(38.8)	(27.3)
21	Log (Lend Amount / Total Assets)	3.5	0.2	-5.0	0.6	26.3	-12.2	-1.5	12.9
		(22.3)	(15.4)	(20.7)	(18.5)	(19.5)	(13.6)	(19.2)	(18.5)
22	Log (Maturity)	4.2	-28.1	-16.5	-69.9	-9.0	8.4	36.7	-5.2
		(109.1)	(47.0)	(79.3)	(47.3)	(113.9)	(40.0)	(87.8)	(50.1)
23	Secured Loan	-150.1	8.7	-295.0	113.3	-305.5	153.9	-86.0	18.5
		(265.8)	(131.1)	(332.1)	(124.0)	(237.2)	(131.4)	(168.3)	(203.4)
Other loan spec. controls		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		294	342	315	321	315	321	287	349
R-squared		0.183	0.128	0.156	0.191	0.136	0.160	0.195	0.152

[+] Significance levels: *** 1%, ** 5%; * 10%

The control phase

Next, we argue that the signals provided by the market through price reactions of equity holders to bank loan announcements also convey evidence of the control phase of market discipline, in the sense that banks managers' behaviour is influenced by and reflected on these market signals. We believe that markets influence banks managers' beliefs and provide incentives for them to take better lending decisions when they are exposed to the monitoring of the market. Table 4.5 provides pieces of evidence supporting that in countries where regulations promoting the private monitoring of banks are more intense, market reactions to loan announcements tend to have a better quality in terms of increasing banks' market value. First, positive reactions have higher magnitudes and are more frequent in countries with more private monitoring regulations, when compared to positive reactions in countries with less regulations of this kind. Second, negative reactions have lower magnitudes and are less frequent in countries with high private monitoring, with respect to countries with low private monitoring. These results corroborate the positive correlation between cumulative abnormal returns (CAR) and *Private_Monitoring* in Table 4.3. Results of the regression analysis of Tables 4.6 and 4.7 confirm that CAR increase with the level of private monitoring of banks. In this sense, banks that are more exposed to external monitoring through mechanisms such as information and accounting disclosure, external auditing and subordinated debt, experience higher positive reactions in their equity value in response to a loan announcement. We interpret it as a beneficial role of market monitoring to banks as it contributes in assuring a business environment where asymmetric information is reduced and market prices reflect sound management practices.

To get a clearer picture of which factors influence different types of bank stock price reactions to loan announcements, we next perform regressions of sub-samples of positive and negative CAR on the full set of explanatory variables, in the [-3,+3] and [-2,+2] days event windows. In addition, we run regressions of the absolute value of CAR on the same variables, with the purpose to help explaining stock price reactions irrespective of their signs. From results in Table 4.9, which show regressions on positive and negative CAR with R-squared above 30%, we notice that the previous inverse U-shaped relationship between *Private_Monitoring* and CAR holds for positive and absolute CAR, but not for negative CAR[22]. These findings suggest that, with respect to bank loan announcements, the private monitoring of banks is important as a market mechanism of validating sound bank risk-taking practices. Moreover, although not significant in explaining negative CAR, higher levels of private monitoring seem to inhibit poor lending practices, as we observe from Table 4.5 that negative CAR are less frequent when private monitoring is high. We claim that, in this context, banks managers' effort to pursue sound risk management in lending increases with the effectiveness of the market monitoring. It means that the effectiveness of the control phase of market discipline depends, to a great degree, on the effectiveness of the recognition phase. In other words, the higher the effectiveness of market monitoring, the more likely banks managers' respond and behave in the direction of improving bank solvency. We believe that our results provide support to this contention.

[22] We checked that the conditional distributions of the *Private_Monitoring* variable given that CAR is either positive or negative do not differ from its distribution when the whole sample of CAR is considered, i.e., positive and negative CAR sub-samples have no selection bias.

Table 4.9 – Determinants of Positive, Negative and Absolute CAR

Dependent variable: CAR (in basis points). Event windows of (-3,+3) and (-2,+2) days. OLS regressions of CAR on country, lender, borrower and loan specific variables. Only arranger banks and significant CAR are included. Robust standard errors clustered by banks are in parenthesis[+].

		Positive CAR		*Negative CAR*		*Absolute CAR*	
	Explanatory Variables	*(-3;+3)*	*(-2;+2)*	*(-3;+3)*	*(-2;+2)*	*(-3;+3)*	*(-2;+2)*
	Lender Country Specific						
1	Private monitoring	463.58 ***	417.99 **	-38.53	-83.56	218.10 *	258.80 **
		(167.10)	(166.36)	(128.19)	(91.59)	(116.93)	(103.32)
2	Private monitoring^2	-27.04 ***	-23.86 **	3.83	5.32	-13.66 **	-15.13 **
		(9.67)	(9.55)	(7.75)	(5.55)	(6.85)	(6.06)
3	Capital Stringency	-13.55	-12.56	6.55	10.98	-10.53	-13.97 **
		(10.24)	(8.25)	(8.79)	(6.65)	(7.22)	(5.34)
4	Official Supervision	7.28	-2.12	-17.78 ***	-7.60	9.96 **	2.04
		(7.02)	(6.76)	(6.34)	(6.63)	(4.64)	(4.38)
5	Financial Development	8.63	-67.67	-48.32	-17.91	38.52	-18.78
		(37.47)	(42.78)	(48.79)	(39.96)	(31.46)	(27.87)
6	Stock Market Development	-57.30 **	-52.52	11.86	3.92	-44.04 **	-29.60 *
		(24.91)	(33.23)	(26.63)	(20.56)	(18.51)	(17.51)
7	Rule of Law	-140.06 **	-17.36	18.05	-1.95	-63.17 *	-6.94
		(66.82)	(70.46)	(53.35)	(39.19)	(37.50)	(36.70)
8	Bank Concentration	216.76 **	173.57	136.02	25.39	-32.14	28.52
		(96.41)	(108.46)	(95.97)	(84.53)	(78.60)	(73.08)
9	Log (Number of Banks)	-9.55	2.07	7.83	-1.47	-6.81	0.06
		(22.20)	(27.04)	(16.79)	(12.83)	(15.92)	(15.57)
10	Log (GDP)	113.18 ***	86.34 **	5.70	4.07	37.08	32.94
		(41.81)	(42.95)	(23.20)	(21.23)	(23.43)	(20.30)
11	Log (GDP per capita)	41.29	-20.47	8.99	67.08 *	26.91	-26.15
		(46.05)	(54.71)	(56.85)	(39.48)	(31.92)	(31.32)
12	GDP growth	3.64	-11.85	9.79	10.11	-3.13	-11.07 **
		(7.34)	(7.38)	(16.36)	(9.84)	(6.66)	(5.55)
	Borrower Country Specific						
13	Sovereign Credit Risk	-6.81	-1.31	-0.62	0.21	-2.33	1.91
		(6.19)	(7.77)	(7.39)	(4.53)	(4.31)	(3.35)
14	Creditor Rights	39.49 **	39.37 **	-28.33	-29.98 **	26.92 **	30.30 ***
		(18.39)	(18.54)	(18.28)	(13.20)	(12.64)	(10.65)
	Lender and Borrower Specific						
15	Log (Assets)	-92.77 ***	-79.96 ***	16.39	-3.06	-53.84 ***	-34.21 **
		(25.90)	(29.30)	(28.82)	(22.88)	(17.56)	(15.49)
16	Leverage	17.89 **	22.57 ***	-24.86 **	-18.23 ***	17.41 ***	16.83 ***
		(7.31)	(8.22)	(11.79)	(6.42)	(5.97)	(4.62)
17	Loan Loss Reserves	4.20	12.68	-4.92	1.69	5.95	7.56 *
		(5.50)	(8.25)	(13.48)	(6.18)	(5.54)	(4.38)
18	Borrower Rating	-57.28	-31.34	40.89	2.02	-47.74	-20.30
		(44.77)	(56.79)	(26.41)	(22.70)	(28.96)	(32.50)
19	Borrower in Same Country	-55.75	-65.22	-33.40	-30.31	-11.50	-11.68
		(47.06)	(52.92)	(32.50)	(29.13)	(25.64)	(23.76)
	Loan Specific						
20	Log (Loan Amount)	1.62	-6.54	1.48	-2.66	-1.40	-4.59
		(15.93)	(14.35)	(12.61)	(8.43)	(10.14)	(8.62)
21	Log (Lender Amount / Total Assets)	-5.30	0.68	-11.09 *	-10.47 *	3.11	5.11
		(7.48)	(6.65)	(5.69)	(5.65)	(3.65)	(3.26)
22	Log (Maturity)	-31.45	-14.52	46.10	7.46	-35.97	-7.24
		(24.07)	(32.82)	(34.74)	(22.22)	(22.10)	(19.83)
23	Secured Loan	-87.57	-73.78	-24.46	-30.10	-29.30	-33.41
		(135.31)	(129.21)	(74.64)	(44.81)	(71.46)	(65.03)
Other loan specific controls		Yes	Yes	Yes	Yes	Yes	Yes
Year dummies		Yes	Yes	Yes	Yes	Yes	Yes
Observations		377	427	376	405	753	832
R-squared		0.3661	0.3280	0.3190	0.3204	0.2740	0.2631

[+] Significance levels: *** 1%, ** 5%; * 10%

Influence of other country-level factors

Thanks to our cross-country analysis that allows us to control and examine how different institutional settings affect markets' reactions to bank loan announcements, we believe that our study contributes to the evaluation of the relative importance of bank regulations promoting the private monitoring of banks in the broad context of regulatory policies. Accordingly, we proceed by providing evidence on the influence of institutional characteristics at the country level on market reactions to loan announcements.

Regarding the other bank regulations variables, there is not evidence of the influence of capital regulations stringency or official supervisory power on CAR in Tables 4.6 and 4.7. Also, (unreported) regressions including interaction terms between the three bank regulations variables show no significant results. Nevertheless, Table 4.8 provides evidence that private monitoring affect CAR only in countries with high official supervisory power, which suggests that these regulatory mechanisms complement each other. Regarding negative CAR reactions reported in Table 4.9, there is evidence that more powerful official supervision decreases CAR, in response to loan announcements. In an unreported regression, we interacted *Official_Supervision* with the level of the enforcement of laws, represented by the *Rule_of_Law* variable, and found a significant and negative coefficient for the interactive term, and a significant and positive coefficient for *Rule_of_Law*. Together, the evidence indicates that the combination of high official supervision and high rule of law boosts a negative CAR reaction, which means that these mechanisms favour the disciplining role of a negative market price reaction in response to poor bank lending practices.

We found evidence that *Rule_of_Law* decreases CAR, according to most regressions in Tables 4.6 and 4.7. It means that CAR are lower in countries with more

developed legal systems. Given that the distributions of CAR in countries with *Rule of Law* above the median is symmetric, such result might suggest that stock market reactions in these countries are less important. Additional evidence on *Rule_of_Law* coming from Table 4.8 shows that *Private_Monitoring* matters when the level of rule of law is low. Such finding corroborates that more important market reactions are associated to low levels of *Rule_of_Law*. While private monitoring is important in countries where the rule of law is weak, it seems that markets believe that banks behave appropriately in countries with strong rule of law, precluding a role for the private monitoring of banks. In this sense, *Rule_of_Law* works as a substitute mechanism to *Private_Monitoring*.

Still on lender country-level variables, results in Table 4.9 show that improving stock market development and the rule of law reduces the bank stock positive reactions to loan announcements, whereas countries with higher concentrated bank industries and higher GDP experience higher CAR. Except from the GDP's coefficients, this piece of evidence seems to favour the private interest view of regulation, as it suggests that private monitoring is more important as a mechanism of rewarding sound bank risk-taking practices, through positive CAR reactions, in countries with less developed stock markets and legal systems, as well as with more concentrated bank industries. Regarding borrower country-level variables, *Creditor_Rights* cause opposite effects on CAR depending on the sign of the reaction, according to Table 4.9. In other words, a positive market reaction to good news in terms of bank lending is stronger when borrower country legal protection of lenders is more developed, while a negative market reaction to a bad bank lending decision is even worse if lenders are more legally protected. We observed in unreported regressions that this effect of *Creditor_Rights* on CAR matters only if lender and borrower are in the same country. We conclude that

legal protection of lenders boosts either positive or negative CAR reactions and is enforceable only if lender and borrower are located in the same country.

Influence of bank and loan level factors

The influence of bank size and leverage on CAR is also remarkable, according to Table 4.9. Increasing bank size - measured by total assets - reduces a positive CAR, but has no influence on a negative CAR reaction. It seems that market reactions to sound bank lending decisions are less important for larger banks. On the other hand, bank leverage affects CAR differently, according to the sign of the reaction. The higher the leverage, the higher is a positive CAR reaction to a loan announcement. By contrast, a negative CAR reaction decreases with bank leverage. Therefore, leverage boosts either good or bad market reactions to loan announcements. This evidence might support the reliance on equity holders as right participants to induce market discipline even if bank probability of default is high. However, unreported tests do not show similar evidence across different levels of capital ratios.

Interesting evidence is also given by the *Log(Lender_Amount / Total_Assets)* variable, in Table 4.9. In the case of negative CAR reactions, the higher the amount lent by the bank (relative to its size), the stronger the negative market reaction. Additional results show that the coefficient for the dummy indicating *Working Capital* loan purpose (unreported in Tables 4.6 and 4.7) is positive and very significant in all regressions that include this dummy. No other coefficient for loan purpose dummy is significant. It tells that financing short term cash flow needs of firms is interpreted as good news by bank stock investors, probably because it is considered a less risky investment decision. Alternatively, it suggests that the reactions may be related to the short maturity of this kind of loans. Indeed, loans with working capital purposes have an

average maturity of 51 months, shorter than the 55, 57, 71 and 129 months on average of loans made with respectively corporate, debt repayment, LBO/MBO and project finance purposes. The exceptions are loans for acquisition line and takeover purposes, which have an average maturity of respectively 51 and 49 months. However, despite the short maturity of these latter kinds of loans, given their peculiarities and the mixed evidence regarding the effect of mergers and acquisitions on acquiring firms' stocks prices (e.g., Bhagat *et al*., 2005), a positive impact on banks' stock prices due to the short maturity feature of acquisition line and takeover purposes loans is not certain.

4.5 Conclusions

This paper provides evidence of stock market reactions to bank loan announcements, focused on bank stock price variations. In addition, it contributes to the empirical literature on market discipline of banks by providing evidence of market monitoring of banks through equity markets' price reactions to loan announcements, as well as evidence of banks' responses to these market reactions in the direction of pursuing sound risk-taking practices. In this sense, we offer evidence of the effectiveness of both recognition and control phases of market discipline, as proposed by the framework of Hamalainen *et al*. (2005).

By applying event-study techniques in a cross-country sample of loan announcements, we first find that stock market reactions - measured by bank stock cumulative abnormal returns - to loan announcements are significant. Second, a regression analysis shows that the higher the level of private monitoring of banks, the higher the positive market reactions to loan announcements, in the form of higher positive cumulative abnormal returns of bank stocks.

Our findings suggest that bank regulations that promote the external private monitoring of banks – e.g., regulatory requirements of information and accounting disclosure, external auditing, depositor protection, use of subordinated debt, and discipline – play a role in influencing bank stock market reactions to banks' risk taking decisions. Particularly, stock markets reward, through increasing bank equity value, good news in terms of sound bank lending, with intensity proportional to the level of private monitoring. We also observe that positive reactions are greater and more frequent in countries with high private monitoring, while negative reactions are lower and more frequent when the private monitoring is low. Our evidence supports the idea that more regulations promoting the private monitoring of banks induce, through enhanced market reactions, the pursuing of sound lending practices on the part of banks' managers.

We also find a decreasing effect of very high levels of private monitoring in positive CAR, which supports the view that the excess of transparency may harm banks' reliance on a certain amount of information opaqueness to provide added-value services. The evidence also highlights the difficulties of reaching the Basel Committee's recommendation of an appropriate balance between the need for meaningful disclosure to allow for effective market discipline and the protection of bank proprietary information.

Furthermore, we find that the private monitoring of banks is especially important in countries where either the legal system or the stock market is poorly developed, the bank industry is low concentrated, or the official bank supervision is strong. The piece of evidence highlighting a role for private monitoring in countries with poor enforcement of law or poorly developed stock markets favours a private interest view of bank regulation, which means that it is precisely in countries with weak institutional

development where supervisors are more likely to be captured, and market discipline emerge as a beneficial mechanism to attain bank performance and stability. These findings also indicate that private monitoring behaves as a substitute to stock market development or the rule of law. The evidence that the private monitoring of banks is important in countries with low concentrated bank industries suggests that 'too-big-to-fail' incentives in these countries are probably less present, which guarantees a role for the private monitoring in reducing bank risk-taking. Finally, the evidence that private monitoring works especially in countries with more powerful official supervision supports the view that these two mechanisms are complementary in achieving bank soundness.

To conclude, we believe that our study contributes to the debate over the appropriateness of incorporating bank regulations that promote the private monitoring of banks in country-level regulatory policies, by investigating whether and how different markets react to bank loan announcements, through a cross-country analysis that allows us to control and examine how different institutional settings affect this mechanism.

Chapter Five

General Conclusions, Contributions and Lines for Further Research

The purpose of this thesis is to contribute to achieve a better understanding of the functioning of banks, by providing empirical evidence of how specific dimensions of bank activity are affected by internal and external corporate governance mechanisms. Three empirical essays were conducted in order to help explaining some banks' outcomes. In the first essay (Chapter 2), we investigated the relationship between bank ownership concentration and both risk and performance, in the presence of broad bank regulations and other country-level conditions that shape the banking industry. In the second essay (Chapter 3), we assessed the relative roles of three broad categories of bank regulations, namely, capital requirements, official supervision and external private monitoring, on the determination of spread and maturity of loan contracts. In the third essay (Chapter 4), we provided evidence indicating that capital markets are important in monitoring banks. In particular we analysed equity markets' price reactions to loan

announcements, and found evidence indicating that banks respond to the markets' scrutiny, pursuing sound risk taking practices.

In Chapter 2 we make use of the so-called Generalized Method of Moments panel data estimation techniques (Arellano and Bond, 1991; Arellano and Bover, 1995; Blundell and Bond, 1998), and apply them to an original and comprehensive cross-country sample of bank accounting and ownership information that also incorporates data on bank regulations and other country-level factors. This allows us to contribute to the existing literature by providing evidence that: (1) banks' ownership concentration and performance have a cubic relationship, supporting the theoretical hypotheses of effective monitoring at low levels of ownership concentration (Jensen and Meckling, 1976); expropriation (Shleifer and Vishny, 1986; Faccio and Stolin, 2006), or loss of managerial discretion (Burkart *et al.*,1997) at moderate ownership concentration; and high costs of expropriation at high levels of ownership concentration (Burkart *et al.*, 1998); (2) the initial positive effect of ownership concentration on performance is stronger when legal protection of shareholders is low; (3) the stringency of capital regulations interacts positively with ownership concentration to increase the performance of banks for low levels of ownership concentration; (4) banks' ownership concentration and risk have an U-shape relationship, supporting that shareholders' incentives to take risk prevail when their equity stake is above a threshold; (5) the stringency of capital regulations is effective in simultaneously reducing risk and improving performance of banks.

In Chapter 3, we perform standard OLS regressions on a large sample of loans extended by banks located in 39 countries to examine how bank regulations regarding capital requirements, official supervision and private monitoring, influence the risk characteristics of loan contracts. We used broad indices proposed by those Barth *et al.*,

(2006) to measure the extension of adoption of these regulations by countries. Given the comprehensiveness of our dataset, we were also able to extend our analysis by examining complementarities and interactions between bank regulatory mechanisms themselves and between these and country factors such as the level of bank competition, financial development and legal enforcement. Contributions of Chapter 3 to the literature are summarized by the following findings: (1) the stringency of capital regulations and loan contracts' risk characteristics (spread and maturity) have an inverse U-shaped relationship; (2) more powerful official supervision is associated with riskier loan contracts; (3) both official supervisory power and private monitoring work as substitutes for capital regulation, helping to reduce the risk measures of loan contracts when capital stringency is low; (4) for high levels of capital stringency, official supervision and private monitoring complement capital regulation in reducing loan contracts' risk measures; (5) for a given country, the degrees of both legal enforcement and competition in the banking industry complement capital and private monitoring regulations and improve the risk characteristics of loan contracts.

Chapter 4 focused on the issue of reliance on market discipline as a bank supervisory mechanism. In the first part it employs event-study techniques to assess market reactions to bank loan announcements in the form of abnormal returns on stocks of a large and diverse cross-country set of banks. Then, OLS regression analysis is used in order to explain how reactions are associated to a country's degree of adoption of regulations that promote the external private monitoring of banks. The variable measuring external private monitoring is an index proposed by Barth *et al*. (2006) that assesses the existence of regulatory requirements of information and accounting disclosure, external auditing, depositor protection, use of subordinated debt, and discipline. Through this setting, which also incorporates other country, bank and loan

level variables, Chapter 4 was able to offer empirical evidence on the effectiveness of the two stages that drive the process of market discipline of banks, namely the recognition and the control phases, according to the framework of Hamalainen *et al.* (2005). The contribution of Chapter 4 is twofold. First, it helps to fill a gap in the literature by providing evidence of market price reactions to loan announcements. Second, it contributes to the debate over the appropriateness of incorporating bank regulations that promote the private monitoring of banks in country-level regulatory policies, by investigating whether and how different markets react to bank loan announcements. The main findings of Chapter 4 are that: (1) abnormal bank stock returns are significant on the days surrounding a bank loan announcement; (2) positive abnormal returns are higher and more frequent in countries with high private monitoring, while negative abnormal returns are lower and more frequent when the private monitoring is low, supporting the idea that more regulations promoting the private monitoring of banks improve the quality of market signals, and induce the pursuing of sound lending practices on the part of banks' managers; (3) private monitoring plays a more important role in countries with low enforced legal systems, poorly developed stock markets, low concentrated banking industry, and strong official bank supervision.

All of these results from the different chapters can be summarized in four important conclusions about the functioning of the banking industry as follows:

- Banks behave in a similar way as non-financial firms in general: they face similar agency problems and use similar corporate governance mechanisms to solve them.

- Capital regulations play an important role in attaining bank efficiency, both from the perspective of regulators, who seek to attain financial stability, and from the perspective of shareholders, who want to improve performance.

- The different regulations imposed by the supervisors on the banking industry interact among them in complex ways, and this in turn affects their influence on the risk taking behaviour of banks. The assumption that the three types of regulations play complementary roles, as advocated by proponents of reinforcing pillars of Basel II, is incorrect.

- Regulations that promote the external private monitoring of banks increase the sensitivity of market reactions to banks' risk taking decisions associated to loan announcements. Thus, stock markets reward, through positive price reactions, the implementation of sound bank lending policies, and induce, through market reactions, the pursuing of sound lending practices on the part of banks' managers.

- Regulations that promote the external private monitoring of banks increase the sensitivity of bank stock prices to announcements of loan decisions. Thus, stock markets reward, through positive price reactions, the implementation of sound bank lending policies, and induce, through market reactions, the pursuing of sound lending practices on the part of banks' managers.

We believe these are interesting contributions to the growing, but still small, literature that studies the governance of banks. Moreover, several lines for further research naturally emerge on subjects related to the ones covered in this thesis.

Related to whether corporate governance issues in banking are similar to those in non-financial firms, which is the subject of Chapter 2 of this thesis, the incorporation to our setting of more detailed data on bank-specific corporate governance, such as board composition, insider ownership and executive compensation schemes, would

allow a deeper investigation of the influence of banks' internal corporate governance choices on their risk and performance. Moreover, this setting could enrich the analyses that assess the agency costs related to poor risk management practices and expropriation of banks' resources by managers or controlling shareholders. For instance, the different degree of earnings management/income smoothing practices among banks and non-banks, observed but not explained by Shen and Chih (2005), could be examined in such a richer setting. This would contribute to the limited literature that looks at the impact of corporate governance on earnings management at banks, as identified by Cornett, McNutt and Tehranian (2006).

The focus of Chapter 3 is on the influence of bank regulations on banks' credit policies in a setting where the corporate governance mechanisms analyzed are only external and at the country level. Our proposal is to incorporate in our setting variables of bank-specific corporate governance traits, in order to investigate whether these characteristics have any influence on the credit policies of lenders. In particular, whether banks lend in better conditions to firms with sound governance practices, whether borrowers' corporate governance factors can help explaining banks' performance, or whether banks specialize across borrowers' corporate governance characteristics.

Furthermore, as more data on bank regulations become available through new surveys of the World Bank, a natural extension of Chapter 3 is to improve the methodology used, by adopting more sophisticated estimation techniques, such as panel data analysis, so as to explain loan contracts' terms and other relationships between lending and bank regulations. For instance, such a setting would allow for a longitudinal analysis of how variations in regulatory measures produce changes in the credit policy of each individual bank. This would help tackling endogeneity issues, when the changes

in regulation may be triggered by certain condition in the credit market, as well as issues related to cost adjustments. Finally, issues of simultaneous versus sequential implementation of both capital requirements and supervision regulations would be properly addressed in a longitudinal study.

Among other findings, Chapter 4 provided empirical evidence supporting the effectiveness of the control phase, or market influence component of market discipline of banks, as proposed by the frameworks of Flannery (2001) and Hamalainen *et al.* (2005). Such interpretation of the results relies on the assumption that we observe an equilibrium situation where banks' managers have incentives to pursue sound risk taking practices, given that markets reward good news in terms of bank lending. In this context, a valuable extension to Chapter 4 would be to develop a theoretical model that predicts such equilibrium as the outcome of a game where banks' behaviour depends on the beliefs of banks' managers about markets' reactions to a particular risk taking policy. In this case, conclusions derived from the empirical evidence of Chapter 4 would be appropriately grounded on theoretical predictions.

As a final comment, we highlight the enormous economic and social relevance of properly understanding all dimensions related to the functioning of banks, remarkably after the seriousness of both the economic downturn and the distress in financial stability experienced worldwide during the time this thesis was written. Thus, we are confident that the issues treated in this thesis will be the subject of intensive research in the near future. Hopefully, the academic community will persevere with continuously rethinking bank regulation "till angels govern", as conjectured by Barth, Caprio and Levine (2006).

Appendix A: Description of Explanatory Variables (Chapter 2)

Variable	Description	Source
Bank specific		
Ownership Concentration	The equity percentage participation of the largest shareholder of the bank. More specifically, it is the total participation of the largest shareholder taken from the *Bankscope* database, i.e., the sum of direct and indirect fractions of the bank's voting rights held by the largest shareholder, whenever this information is available. Often, only the direct participation is available, and this value is used instead. Quadratic and cubic variables for ownership concentration are also generated for the examination of a cubic relationship between performance and ownership.	*Bankscope*.
Revenue Growth	The bank's average growth in total revenues respect to the previous year.	Calculations on data from *Bankscope*.
Size	Natural logarithm of bank's annual total assets in thousands of US dollars.	*Bankscope*.
Leverage	The bank's ratio of total debt to total assets.	*Bankscope*.
State Owned	A dummy indicating if the largest shareholder of the bank is the government of a country or State. It is included to control for government ownership, which is argued to affect principal-agent relationships (Levine, 2003), and to be associated with poorly developed banks (Barth et al., 1999).	*Bankscope*.
Bank regulations		
Capital Stringency	It is the Capital Requirements Stringency Index of Barth *et al*. (2006). It measures the level of stringency of capital restrictions imposed to banks, such as eligible funds for entering in the banking industry, and the use of risk based approaches by central banks when defining capital ratio requirements. Constructed for three periods (1997-2000, 2001-2003 and 2004-2007), using data from the surveys on bank regulation and supervision conducted by the *World Bank*. In our data, it ranges from 2 to its maximum possible value of 10, with higher values representing stricter capital regulations.	Barth *et al*. (2001, 2006, 2008).

Variable	Description	Source
Official Supervisory Power	It is the Official Supervisory Power Index of Barth *et al*. (2006). It represents the degree of the power that the supervisor authority has to oversee and intervene in banks functioning. Also constructed for three periods (1997-2000, 2001-2003 and 2004-2007), using data from the surveys on bank regulation and supervision conducted by the *World Bank*. In our data, the index ranges from 4 to 14.	Barth *et al*. (2001, 2006, 2008).
Private Monitoring	It is the Private Monitoring Index of Barth *et al*. (2006). It gives a measure of the degree to which banks are exposed to external monitoring, apart from official regulatory and supervisory oversight. It comprises regulatory requirements of information and accounting disclosure, external auditing, depositor protection, use of subordinated debt, and discipline. The index was constructed for three periods (1997-2000, 2001-2003 and 2004-2007), using data from the surveys on bank regulation and supervision conducted by the *World Bank*. Higher values of the index represent more regulations promoting the private monitoring of banks.	Barth *et al*. (2001, 2006, 2008).
Other country specific		
Shareholders Rights	It is the measure of a country's degree of legal protection of minority shareholders against expropriation by corporate insiders, represented by the anti-self-dealing index of Djankov et al. (2008). These authors argue that such index is better than their previous La Porta et al. (1998)'s anti-director rights index to explain a variety of stock market outcomes. It is assumed constant all over the period from 1997 to 2007.	Djankov et al. (2008).
Financial Development	A proxy of a country's financial development, constructed by Beck *et al*. (2000), using raw data from the IMF's International Financial Statistics, October 2008. This variable is given by the total credit to the private sector by deposit money banks, as a share of GDP. It is available for each year of the period. Higher values of this variable should correspond to more developed financial systems. If it is originally missing, zero is assigned to this variable, and a separate indicator for missing value is included.	Beck *et al*. (2000).

Variable	Description	Source
Rule of Law	It is a country governance indicator constructed by Kaufmann *et al*. (2008) measuring perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The authors rely on multiple sources to construct a weighted aggregate indicator.	Kaufmann *et al*. (2008).
Bank Concentration	Total assets of country's three largest banks as a share of assets of all commercial banks, constructed by Beck et al. (2000) using data from the *Fitch's Bankscope* database. It reflects the level of concentration in the banking industry.	Beck *et al*. (2000).
Log (Number of Banks)	It is the logarithm of the number of commercial banks in the country, made available by Barth *et al*. (2001, 2006, 2008), based on the surveys on bank regulation and supervision conducted by the *World Bank*.	Barth *et al*. (2001, 2006, 2008).
Log (GDP)	The logarithm of the annual country's Gross Domestic Product (GDP), where GDP is given in billions of US Dollars. This variable is supposed to measure the size of a country's economy.	*IMF, International Financial Statistics*
Log (GDP per capita)	The logarithm of the annual country's GDP per capita. This variable is relied as a measure of a country's economic development.	*IMF, International Financial Statistics*
GDP growth	The percent growth in a country's GDP from the previous year to the current year. This variable reflects a country's business cycle.	*IMF, International Financial Statistics*
Country-Average ROA	Annual return on assets averaged across all banks in the country.	Calculations on data from *Bankscope*.

Appendix B: Description of Explanatory Variables (Chapter 3)

Variable	Description	Source
Lender country specific		
Capital Stringency	It is the Capital Requirements Stringency Index of Barth *et al*. (2006). It measures the level of stringency of capital restrictions imposed to banks, such as eligible funds for entering in the banking industry, and the use of risk based approaches by central banks when defining capital ratio requirements. Constructed for three periods (1998-2000, 2001-2003 and 2004-2006), using data from the surveys on bank regulation and supervision conducted by the *World Bank*. In our data, it ranges from 2 to its maximum possible value of 10, with higher values representing stricter capital regulations.	Barth *et al*. (2001, 2006, 2008).
Official Supervisory Power	It is the Official Supervisory Power Index of Barth *et al*. (2006). It represents the degree of the power that the supervisor authority has to oversee and intervene in banks functioning. Also constructed for three periods (1998-2000, 2001-2003 and 2004-2006), using data from the surveys on bank regulation and supervision conducted by the *World Bank*. In our data, the index ranges from 4 to 15.5.	Barth *et al*. (2001, 2006, 2008).
Private *Monitoring*	It is the Private Monitoring Index of Barth *et al*. (2006). It gives a measure of the degree to which banks are exposed to external monitoring, apart from official regulatory and supervisory oversight. It comprises regulatory requirements of information and accounting disclosure, external auditing, depositor protection, use of subordinated debt, and discipline. The index was constructed for three periods (1998-2000, 2001-2003 and 2004-2006), using data from the surveys on bank regulation and supervision conducted by the *World Bank*. Higher values of the index represent more regulations promoting the private monitoring of banks.	Barth *et al*. (2001, 2006, 2008).
Financial Development	A proxy of a lender's country financial development, constructed by Beck *et al*. (2000), using raw data from the IMF's International Financial Statistics, October 2008. This variable is given by the total credit to the private sector by deposit money banks, as a share of GDP. It is available for each year of the period. Higher values of this variable should correspond to more developed financial systems.	Beck *et al*. (2000).

Variable	Description	Source
Log (Number of Banks)	It is the natural logarithm of the number of commercial banks in the country, made available by Barth *et al*. (2001, 2006, 2008), based on the surveys on bank regulation and supervision conducted by the *World Bank*.	Barth *et al*. (2001, 2006, 2008).
Rule of Law	It is a country governance indicator constructed by Kaufmann *et al*. (2008) measuring perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The authors rely on multiple sources to construct a weighted aggregate indicator.	Kaufmann *et al*. (2008).
Borrower country specific		
Creditor Rights	It is the index of La Porta *et al*. (1998), which measures a country's level of legal protection of lenders, against expropriation by borrowers. It is assumed constant along the period from 1997 to 2006. If it is not available for a country, zero is assigned to this variable, and a separate indicator for creditor rights index missing is included.	La Porta *et al*. (1998)
Log (GDP)	The natural logarithm of the annual country's Gross Domestic Product (GDP), where GDP is given in billions of US Dollars. This variable is supposed to measure the size of a country's economy.	*IMF (International Financial Statistics)*
Log (GDP per capita)	The natural logarithm of the annual country's GDP per capita. This variable is relied as a measure of a country's economic development.	*IMF (International Financial Statistics)*
GDP growth	The percent growth in a country's GDP from the previous year to the current year. This variable reflects a country's business cycle.	*IMF (International Financial Statistics)*
Sovereign Credit Risk	It is an index ranging from 1 to 24, representing the borrower's country Fitch Sovereign Rating on foreign currency, long term debt. Higher values of the index represent higher risk. It is available for each year.	*Fitch Ratings.*

Variable	Description	Source
Lender specific		
Log (Assets)	The natural logarithm of the total assets of the bank. It is a measure of the size of the bank. Available for each year.	*Bankscope.*
Leverage	It is the ratio of total book value of liabilities to total book value of assets. It is available for each year.	*Bankscope.*
Borrower specific		
Debt Rating	This variable consists of an index ranging from 1 to 6, representing the Moody's senior debt rating at the close of the loan. When Moody's ratings are missing, S&P ratings are used. The index equal to 1 represents a rating of "Aaa", 2 indicates "Aa", and 6 indicates "B" or worse. If there is no rating information for the borrower, zero is assigned to this variable.	*LPC DealScan.*
Same country	A dummy variable that indicates if the loan was made to a borrower in the same country as the lender.	*LPC DealScan*
Industry sector	Ten indicators, corresponding to the first digit of the SIC code that describes the broad sector of activity of the borrower.	*LPC DealScan.*
Loan specific		
Log (Loan Amount)	It is the natural logarithm of the loan deal amount, expressed in US Dollars.	*LPC DealScan.*
Loan Purpose dummies	These are 7 indicators of the most common specific purposes of the loan, which accounts for 82% of the loans in the sample. These purposes are: Acquisition line, CP backup, Corporate Purposes, Debt Repayment, LBO/MBO, Takeover, and Working Capital.	*LPC DealScan.*
Loan Type dummies	Five variables, accounting for 77% of the loans in the sample, indicating the most common types of deals: 364-day facility, Term Loan, and Revolver line >= 1 year.	*LPC DealScan.*

Appendix C: Description of Explanatory Variables (Chapter 4)

Variable	Description	Source
Lender country specific		
Private Monitoring	It is the Private Monitoring Index of Barth *et al*. (2006). It gives a measure of the degree to which banks are exposed to external monitoring, apart from official regulatory and supervisory oversight. It comprises regulatory requirements of information and accounting disclosure, external auditing, depositor protection, use of subordinated debt, and discipline. The index was constructed for three periods (1998-2000, 2001-2003 and 2004-2006), using data from the surveys on bank regulation and supervision conducted by the *World Bank*. Higher values of the index represent more regulations promoting the private monitoring of banks.	Barth *et al*. (2001, 2006, 2008).
Capital Stringency	It is the Capital Requirements Stringency Index of Barth *et al*. (2006). It measures the level of stringency of capital restrictions imposed to banks, such as eligible funds for entering in the banking industry, and the use of risk based approaches by central banks when defining capital ratio requirements. Constructed for three periods (1998-2000, 2001-2003 and 2004-2006), using data from the surveys on bank regulation and supervision conducted by the *World Bank*. In our data, it ranges from 2 to its maximum possible value of 10, with higher values representing stricter capital regulations.	Barth *et al*. (2001, 2006, 2008).
Official Supervisory Power	It is the Official Supervisory Power Index of Barth *et al*. (2006). It represents the degree of the power that the supervisor authority has to oversee and intervene in banks functioning. Also constructed for three periods (1998-2000, 2001-2003 and 2004-2006), using data from the surveys on bank regulation and supervision conducted by the *World Bank*. In our data, the index ranges from 4 to 15.5.	Barth *et al*. (2001, 2006, 2008).
Financial Development	A proxy of a lender's country financial development, constructed by Beck *et al*. (2000), using raw data from the IMF's International Financial Statistics, October 2008. This variable is given by the total credit to the private sector by deposit money banks, as a share of GDP. It is available for each year of the period. Higher values of this variable should correspond to more developed financial systems.	Beck *et al*. (2000).

Variable	Description	Source
Stock Market Development	A variable reflecting the stock market capitalization of the country, given by the value of listed shares to GDP. It was constructed by Beck *et al*. (2000), using data from the *Standard and Poor's Emerging Market Database* (and *Emerging Stock Markets Factbook*), *World Development Indicators*, and the *IMF's International Financial Statistics*, October 2008. Higher values of this variable represent larger stock markets.	Beck *et al*. (2000).
Rule of Law	It is a country governance indicator constructed by Kaufmann *et al*. (2008) measuring perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The authors rely on multiple sources to construct a weighted aggregate indicator.	Kaufmann *et al*. (2008).
Bank Concentration	Total assets of country's three largest banks as a share of assets of all commercial banks, constructed by Beck et al. (2000) using data from the *Fitch's Bankscope* database. It reflects the level of concentration in the banking industry.	Beck *et al*. (2000).
Log (Number of Banks)	It is the logarithm of the number of commercial banks in the country, made available by Barth *et al*. (2001, 2006, 2008), based on the surveys on bank regulation and supervision conducted by the *World Bank*.	Barth *et al*. (2001, 2006, 2008).
Log (GDP)	The logarithm of the annual country's Gross Domestic Product (GDP), where GDP is given in billions of US Dollars. This variable is supposed to measure the size of a country's economy.	*IMF (International Financial Statistics)*
Log (GDP per capita)	The logarithm of the annual country's GDP per capita. This variable is relied as a measure of a country's economic development.	*IMF (International Financial Statistics)*
GDP growth	The percent growth in a country's GDP from the previous year to the current year. This variable reflects a country's business cycle.	*IMF (International Financial Statistics)*

Variable	Description	Source
Borrower country specific		
Sovereign Credit Risk	It is an index ranging from 1 to 24, representing the borrower's country Fitch Sovereign Rating on foreign currency, long term debt. Higher values of the index represent higher risk. It is available for each year.	*Fitch Ratings.*
Creditor Rights	It is the index of La Porta *et al*. (1998), which measures a country's level of legal protection of lenders, against expropriation by borrowers. It is assumed constant along the period from 1997 to 2006. If it is not available for a country, zero is assigned to this variable, and a separate indicator for creditor rights index missing is included.	La Porta *et al*. (1998)
Lender specific		
Log (Assets)	The logarithm of the total assets of the bank. It is a measure of the size of the bank. Available for each year.	*Bankscope.*
Leverage	It is the ratio of total book value of liabilities to total book value of assets. It is available for each year.	*Bankscope.*
Loan Loss Reserves / Gross Loans	It is the average annual ratio of a bank's loan loss reserves to gross loans.	*Bankscope.*
Borrower specific		
Debt Rating	This variable consists of an index ranging from 1 to 6, representing the Moody's senior debt rating at the close of the loan. When Moody's ratings are missing, S&P ratings are used. The index equal to 1 represents a rating of "Aaa", 2 indicates "Aa", and 6 indicates "B" or worse. If there is no rating information for the borrower, zero is assigned to this variable.	*LPC DealScan.*
Same country	A dummy variable that indicates if the loan was made to a borrower in the same country as the lender.	*LPC DealScan*
Industry sector	Ten indicators, corresponding to the first digit of the SIC code that describes the broad sector of activity of the borrower.	*LPC DealScan.*

Variable	Description	Source
Loan specific		
Log (Loan Amount)	It is the logarithm of the loan deal amount, expressed in US Dollars.	*LPC DealScan.*
Log (Lender Amount / Total Assets)	It is the logarithm of the ratio between the share amount of the underlying arranger lender and its total assets. The numerator was computed by multiplying the loan deal amount by the percentage loan share of the lender, whenever this information is available in the *DealScan* database. Otherwise, it was computed as the average loan amount per lender, i.e., the loan deal amount divided by the number of lenders that participate in the loan.	*LPC DealScan and Bankscope.*
Spread	This variable corresponds to the "All-in Spread Drawn" information available for each deal in the *DealScan* database. It corresponds to the base points in excess of the interbank market rate that is asked by lenders to borrowers in a deal. It also incorporates any charged fees associated to the loan.	*LPC DealScan.*
Log (Maturity)	It is the logarithm of the maturity, expressed in number of months, of a loan.	*LPC DealScan.*
Secured	A dummy for whether the loan has a collateral. If it is originally missing, zero is assigned to this variable.	*LPC DealScan.*
Loan Purpose dummies	These are 7 indicators of the most common specific purposes of the loan, which accounts for 82% of the loans in the sample. These purposes are: Acquisition line, Corporate Purposes, Debt Repayment, LBO/MBO, Project Finance, Takeover, and Working Capital.	*LPC DealScan.*
Loan Type dummies	Five variables, accounting for 77% of the loans in the sample, indicating the most common types of deals: 364-day facility, Fixed-Rate, Term Loan, Revolver line >= 1 year, and Other Loan.	*LPC DealScan.*

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